# LC4.1E
**AA**

Service
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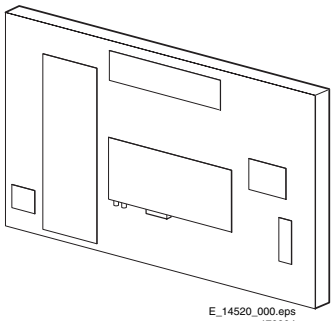


# Service Manual





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PHILIPS

# 1. Technical Specifications, Connections and Chassis Overview

## 1.1 Technical Specifications

### 1.1.1 Vision

| | | |
|---|---|---|
| Display type | : | 14 inch: LCD-VA |
| | : | 15 inch: DV-LCD-IPS |
| | : | 17-23 inch: DV-LCD-IPS |
| Screen size: | : | 14 inch (37 cm) |
| | : | 15 inch (38 cm) |
| | : | 17 inch (45 cm) |
| | : | 20 inch (51 cm) |
| | : | 23 inch (59 cm) |
| Resolution (HxV) | : | 14 inch: 640x480 (VGA) |
| | : | 15 inch: 1024x768 (XGA) |
| | : | 17 inch: 1280x768 (WXGA) |
| | : | 20 inch: 640x480 (VGA) |
| | : | 23 inch: 1280x768 (WXGA) |
| Viewing angle | : | 14 inch: 170x170 deg. |
| | : | 15 inch: 130x100 deg. |
| | : | 17-23 inch: 176x176 deg. |
| Light output | : | 450 cd/m$^2$ |
| Tuning system | : | PLL |
| Colour systems | : | PAL B/G, D/K, I |
| | : | SECAM B/G, D/K, L, L1 |
| Video playback | : | NTSC, PAL, SECAM |
| Channel selections | : | 100 channels |
| | : | PLL |
| Aerial input | : | 75 ohm |
| | : | Coax |

### 1.1.2 Sound

| | | |
|---|---|---|
| Sound systems | : | BI NICAM BG |
| | : | 2CS BG |
| | : | FM/FM (5.5-5.74) |
| | : | (B/G) |
| | : | NICAM B/G (5.5-5.85) |
| | : | NICAM D/K (6.5-5.85) |
| | : | NICAM I (6.0-6.52) |
| | : | NICAM L (6.5(AM)-5.85) |
| Maximum power | : | 14-17 inch: 2x2 W |
| | : | 20-23 inch: 2x5 W |

### 1.1.3 Miscellaneous

| | | |
|---|---|---|
| Power supply: | | |
| - Mains voltage | : | 90-240 V ac |
| - Mains frequency | : | 50 / 60 Hz |
| Ambient conditions: | | |
| - Temperature range | : | +5 to +40 °C |
| - Maximum humidity | : | 90 % R.H. |
| Power consumption | | |
| - Normal operation | : | from 32 W |
| | : | to 110 W |
| - Standby | : | < 2 W |

## 1.2 Connections

### 1.2.1 Rear Connections

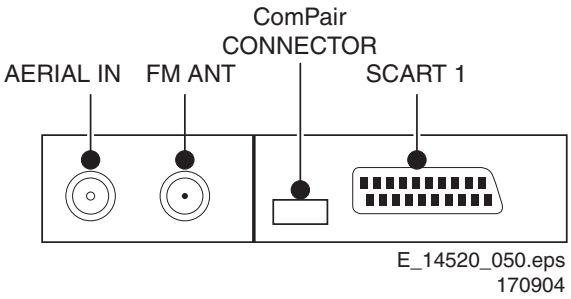


**Figure 1-1 Rear connections**

***Aerial - In***
- IEC-type Coax, 75 ohm

***FM Ant***
- IEC-type Coax, 75 ohm

***SCART1: RGB/YUV - In, CVBS - In/Out, Audio - In/Out***

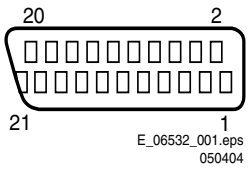


**Figure 1-2 SCART connector**

| | | | |
|---|---|---|---|
| 1 | - Audio - R | 0.5 V_rms / 1 kohm | ⊖→ |
| 2 | - Audio - R | 0.5 V_rms / 10 kohm | ⊖ |
| 3 | - Audio - L | 0.5 V_rms / 1 kohm | ⊖→ |
| 4 | - Audio - gnd | Ground | ⏚ |
| 5 | - Blue - gnd | Ground | ⏚ |
| 6 | - Audio - L | 0.5 V_rms / 10 kohm | ⊖ |
| 7 | - Blue/U - in | 0.7 V_pp / 75 ohm | ⊖ |
| 8 | - CVBS - status | 0 - 2 V: INT<br>4.5 - 7 V: EXT 16:9<br>9.5 - 12 V: EXT 4:3 | ⊖ |
| 9 | - Green - gnd | Ground | ⏚ |
| 10 | - n.c. | | |
| 11 | - Green/Y - in | 0.7 V_pp / 75 ohm | ⊖ |
| 12 | - n.c. | | |
| 13 | - Red - gnd | Ground | ⏚ |
| 14 | - FBL - gnd | Ground | ⏚ |
| 15 | - Red/V - in | 0.7 V_pp / 75 ohm | ⊖ |
| 16 | - Status/FBL | 0 - 0.4 V: INT<br>1 - 3 V: EXT / 75 ohm | ⊖ |
| 17 | - Video | Ground | ⏚ |
| 18 | - Video | Ground | ⏚ |
| 19 | - CVBS - out | 1 V_pp / 75 ohm | ⊖→ |
| 20 | - CVBS - in | 1 V_pp / 75 ohm | ⊖ |
| 21 | - Shielding | Ground | ⏚ |

***VGA: RGB - In***

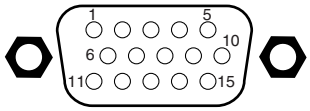


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**Figure 1-3 VGA Connector**

| | | | |
|---|---|---|---|
| 1 | - Red | 0.7 V_pp / 75 ohm | ⊕ |
| 2 | - Green | 0.7 V_pp / 75 ohm | ⊕ |
| 3 | - Blue | 0.7 V_pp / 75 ohm | ⊕ |
| 4 | - | Ground | ⏚ |
| 5 | - | Ground | ⏚ |
| 6 | - Red - gnd | Ground | ⏚ |
| 7 | - Green - gnd | Ground | ⏚ |
| 8 | - Blue - gnd | Ground | ⏚ |
| 9 | - 5V_DC | +5 V_dc | ⊕ |
| 10 | - | Ground | ⏚ |
| 11 | - | Ground | ⏚ |
| 12 | - DDC_SDA | DDC data | ⊕ |
| 13 | - H-sync | 0 - 5 V | ⊕ |
| 14 | - V-sync | 0 - 5 V | ⊕ |
| 15 | - DDC_SCL | DDC clock | ⊕ |

### 1.2.2 Side Connections


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**Figure 1-4 Side connections**

***Mini Jack: Audio - in***

| | | | |
|---|---|---|---|
| 4 | - Audio - L | 0.5 Vrms / 10 kohm | ⊕◎ |
| 3 | - Audio - R | 0.5 Vrms / 10 kohm | ⊕◎ |

***S-VHS - In Hosiden***

| | | | |
|---|---|---|---|
| 1 | - Y | Ground | ⏚ |
| 2 | - C | Ground | ⏚ |
| 3 | - Y | 1 Vpp/75 ohm | ⊕ |
| 4 | - C | 0.3 Vpp/75 ohm | ⊕ |

***Video - In (Cinch)***

| | | | |
|---|---|---|---|
| 1 | - CVBS | 1 Vpp/75 ohm | ⊕◎ |

***Audio - In (Cinch)***

| | | | |
|---|---|---|---|
| 1 | - Audio - R | 0.5 Vrms/10 k ohm | ⊕◎ |
| 2 | - Audio - L | 0.5 Vrms/10 k ohm | ⊕◎ |

***Jack: Headphone- Out***

| | | | |
|---|---|---|---|
| Bk | - Headphone | 32 - 600 ohm / 10 mW | 6.3mm |

## 1.3 Chassis Overview

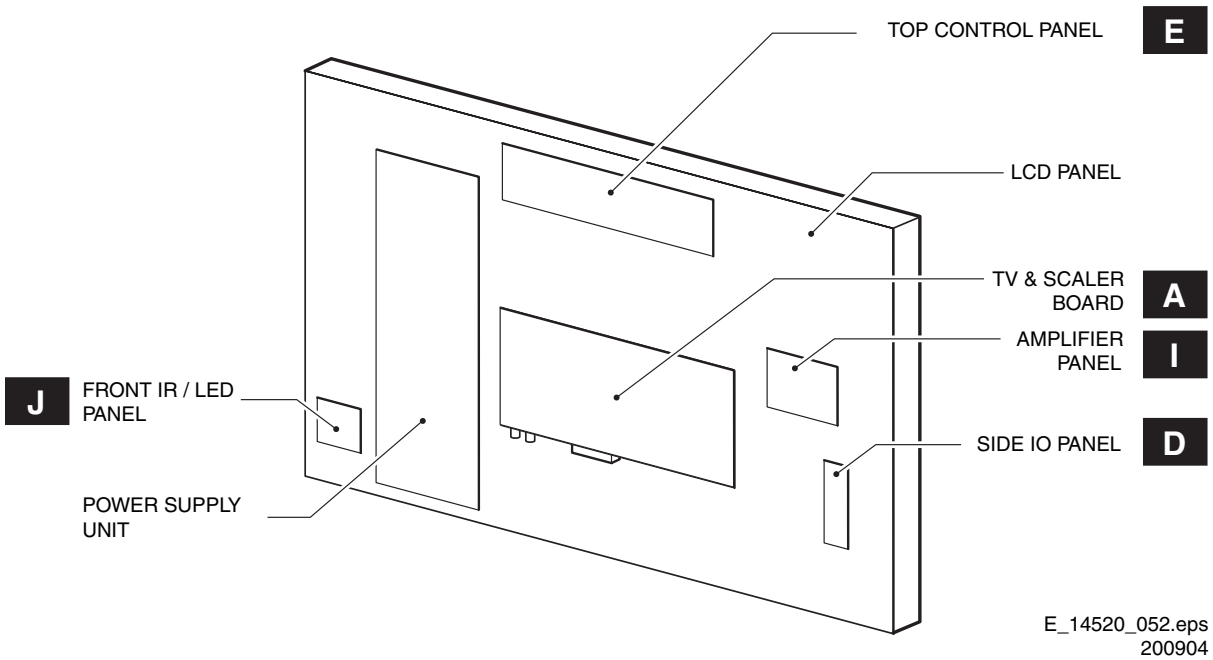


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**Figure 1-5 Chassis Overview**

# 2. Safety Instructions, Warnings, and Notes

## 2.1 Safety Instructions

Safety regulations require that **during** a repair:
- Connect the set to the Mains (AC Power) via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:
- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the Mains (AC Power) lead for external damage.
- Check the strain relief of the Mains (AC Power) cord for proper function.
- Check the electrical DC resistance between the Mains (AC Power) plug and the secondary side (only for sets which have a Mains (AC Power) isolated power supply):
  1. Unplug the Mains (AC Power) cord and connect a wire between the two pins of the Mains (AC Power) plug.
  2. Set the Mains (AC Power) switch to the "on" position (keep the Mains (AC Power) cord unplugged!).
  3. Measure the resistance value between the pins of the Mains (AC Power) plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
  4. Switch "off" the set, and remove the wire between the two pins of the Mains (AC Power) plug.
- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

## 2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
  Available ESD protection equipment:
  – Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
  – Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

## 2.3 Notes

### 2.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (⊓⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in standby (⏻). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. “Dolby”, “Pro Logic” and the “double-D symbol”, are trademarks of Dolby Laboratories.


**Figure 2-1 Dolby PL Symbol**

### 2.3.2 Schematic Notes

- All resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads ($\mu$= x$10^{-6}$), nano-farads (n= x$10^{-9}$), or pico-farads (p= x$10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Electrical Replacement Parts List. Therefore, always check this list when there is any doubt.

### 2.3.3 Rework on BGA (Ball Grid Array) ICs

***General***

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

***Device Removal***

As is the case with any component that, it is essential when removing an (LF)BGA, the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the chance of warping the PWB.
To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

***Area Preparation***

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA.
Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.
After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.

**Note:** Do not apply solder paste, as this has shown to result in problems during re-soldering.

***Device Replacement***
The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. To reflow the solder, apply a temperature profile according to the *IC data sheet*. So as not to damage neighbouring components, it may be necessary to reduce some temperatures and times.

***More Information***
For more information on how to handle BGA devices, visit this URL: *www.atyourservice.ce.philips.com* (needs subscription, not available for all regions) ). After login, select “Magazine”, then go to “Workshop Information”. Here you will find Information on how to deal with BGA-ICs.

### 2.3.4 Lead Free Solder

Some PWBs in this chassis are “lead-free **prepared**”. This is indicated on the PWB by the PHILIPS lead-free logo (either by a service-printing or by a sticker). It does not mean that lead-free solder is actually used!

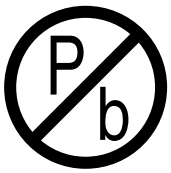


**Figure 2-2 Lead-free logo**

Due to this fact, some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment.
- Use only adequate solder tools applicable for lead-free soldering tin.
- Adjust your solder tool so that a temperature around 217 - 220 deg. C is reached at the solder joint.
- Do not mix lead-free soldering tin with leaded soldering tin; this will lead to unreliable solder joints!
- Use only original spare parts listed in this manual. These are lead-free parts!
- On the website *www.atyourservice.ce.philips.com* (needs subscription, not available for all regions) you can find more information on:
  - Aspects of lead-free technology.
  - BGA (de-)soldering, heating-profiles of BGAs used in Philips sets, and others.

### 2.3.5 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages**. While some may not be dangerous in themselves, they can cause unexpected reactions - reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

# 3. Directions for Use

You can download this information from the following website:
http://www.philips.com/support

# 4. Mechanical Instructions

**Index of this chapter:**



**Note:** Figures below can deviate from the actual situation, due to different set executions.

**Note:** To diagnose the set with ComPair it is **not** needed to open the set entirely.
To access the ComPair connector, proceed with the following:
1. Manually unlock and remove the cover cap.
2. Remove the tape shielding that covers the ComPair connector (1).

**Note:** Make sure that both the ComPair connector and the UART connector are shielded off with a piece of insulating tape after repair for ESD reasons. Place this tape over the holes in the rear cover of the set.

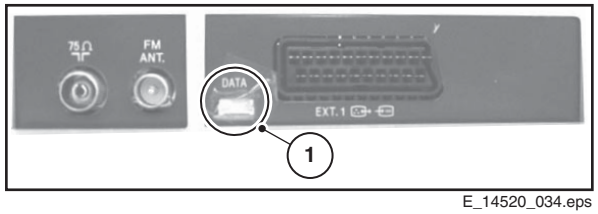


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**Figure 4-1 ComPair connector**

## 4.1 Service Position

### 4.1.1 Foam Bars

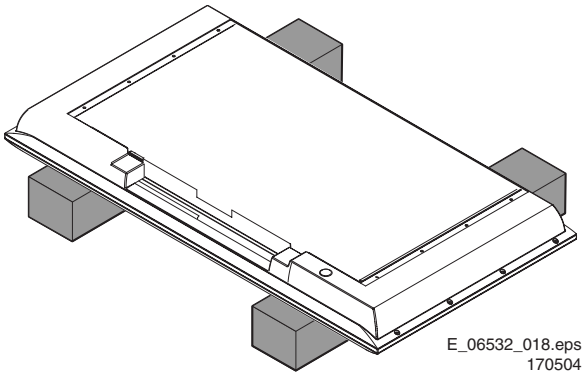

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**Figure 4-2 Foam bars**

The foam bars (order code 3122 785 90580) can be used for all types and sizes of Flat TVs. By laying the plasma or LCD TV flat on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By placing a mirror under the TV, you can easily monitor the screen.

## 4.2 Rear Cover Removal

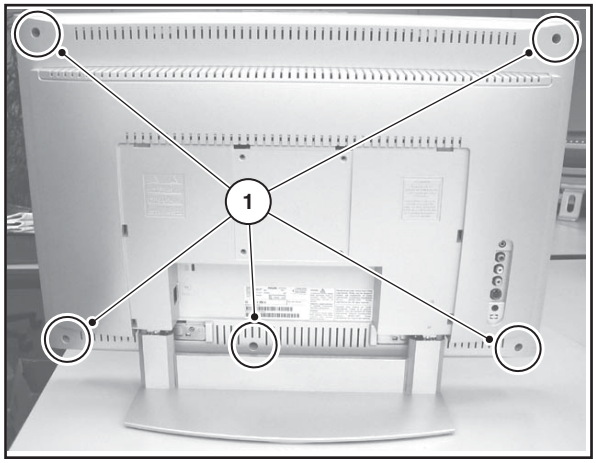


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**Figure 4-3 Rear cover removal**

1. Make sure all power-, audio-, video- and coax- cables are unplugged.
2. Remove all Torx screws (1) around the edges of the rear cover.
3. Remove the rear cover and store it in a safe place.

## 4.3 Power Supply Unit Removal

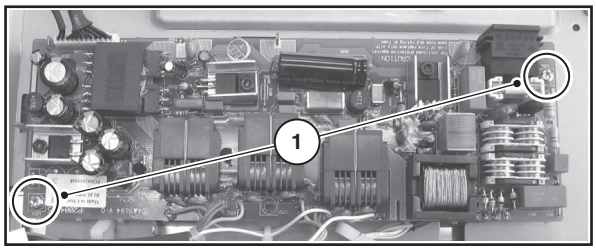


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**Figure 4-4 Power supply unit**

1. Disconnect all cables from the Power supply unit.
2. Remove all mounting screws (1) from the Power supply unit.
3. Take out the Power supply unit.

## 4.4 TV & Scaler Board Removal

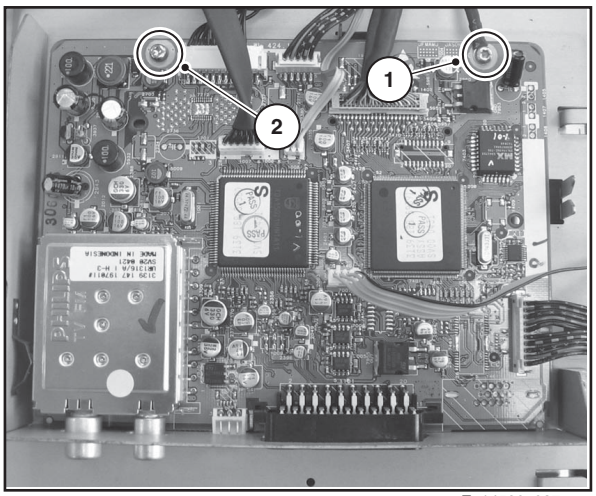


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**Figure 4-5 TV & Scaler board removal**

1. Disconnect all cables from the TV & Scaler board.
2. Remove the screw from the grounding cable (1).
3. Remove the mounting screw (2) and remove the board.

## 4.5 Side I/O Panel Removal

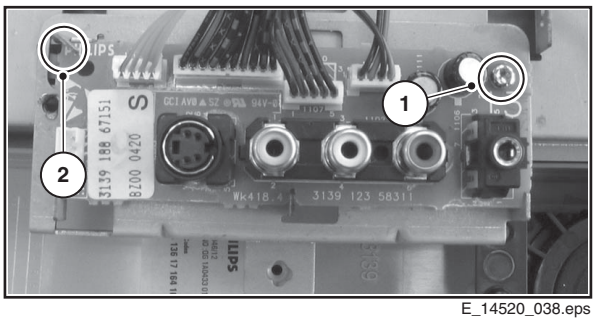


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**Figure 4-6 Side I/O panel removal**

1. Disconnect all cables from the Side I/O panel.
2. Remove the mounting screw (1).
3. Unlock the panel by twisting back the clamp at the bottom (2).
4. Take out the Side I/O panel from the bracket.

## 4.6 Top Control Panel Removal

1. Disconnect the cable from the top control panel.
2. Remove the two mounting screws from the top control panel.
3. Take out the top control panel.

## 4.7 Audio Amplifier Panel Removal

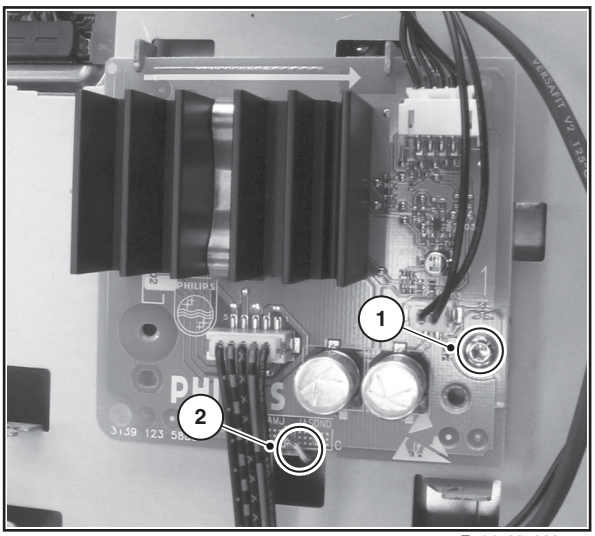


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**Figure 4-7 Audio amplifier panel removal**

1. Disconnect all cables from the audio amplifier panel.
2. Remove all mounting screws from the audio amplifier panel (1).
3. Unlock the panel by twisting back the clamp at the bottom (2).
4. Take out the audio amplifier panel.

## 4.8 Exchanging the LCD Panel

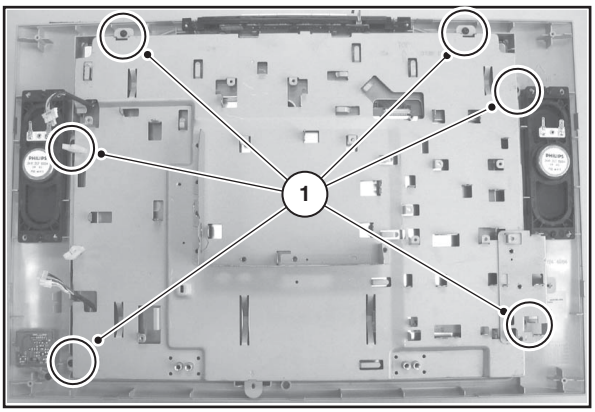


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**Figure 4-8 Exchanging the LCD panel**

1. Disconnect all cables from the LCD Panel.
2. Remove all mounting screws (1) from the metal cover.
3. Lift and take off the metal cover.
4. Now you can exchange the LCD panel.

## 4.9 Re-Assembly

To re-assemble the whole set, do all processes in reverse order.

**Notes:**
Do **not** forget to replace the ground cable of the TV & Scaler board, while mounting the screw at the board topside. See figure “TV & Scaler board removal”.

# 5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:


## 5.1 Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or Ixxx. These test points are specifically mentioned in the service manual as “half moons” with a dot in the centre.
Perform measurements under the following conditions:
- Television set in Service Default Alignment Mode.
- Video input: Colour bar signal.
- Audio input: 3 kHz left channel, 1 kHz right channel.

## 5.2 Service Modes

Service Default mode (SDM) and Service Alignment Mode (SAM) offers several features for the service technician, while the Customer Service Mode (CSM) is used for communication between the call centre and the customer.

This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the abilities of structured troubleshooting, error code reading, and software version readout for all chassis.
*Minimum requirements for ComPair:* a Pentium processor, a Windows OS, and a CD-ROM drive (see also paragraph "ComPair").

### 5.2.1 Service Default Mode (SDM)

***Purpose***
- To create a predefined setting for measurements to be made.
- To override software protections.
- To start the blinking LED procedure.
- To inspect the error buffer.
- To check the life timer.

***Specifications***
- Tuning frequency: 475.25 MHz.
- Colour system: PAL-BG.
- All picture settings at 50% (brightness, colour contrast, hue).
- Bass, treble and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled. The service unfriendly modes are:
  - Timer / Sleep timer.
  - Child / parental lock.
  - Blue mute.
  - Hotel / hospital mode.
  - Auto shut off (when no “IDENT” video signal is received for 15 minutes).
  - Skipping of non-favourite presets / channels.
  - Auto-storage of personal presets.
  - Auto user menu time-out.
  - Auto Volume Levelling (AVL).

***How to enter***
To enter SDM, use one of the following methods:
- Press the following key sequence on the remote control transmitter: “062596” directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
- Short "Service" jumpers on the TV board during cold start and apply mains (see Figure "Service jumpers"). Then press the mains button (remove the short after start-up). **Caution**: Entering SDM by shorting "Service" jumpers will override the +5V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could damage the television set.
- Or via ComPair.

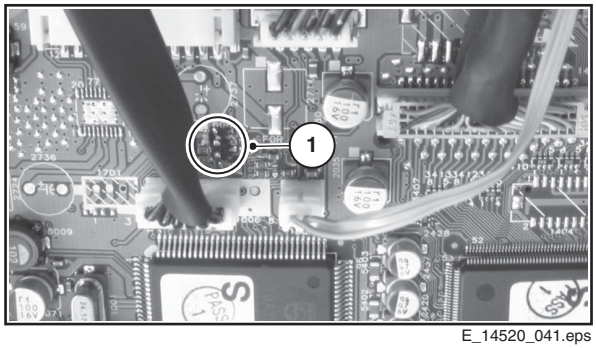


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**Figure 5-1 Service jumpers**

After entering SDM, the following screen is visible, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Alignment Mode.

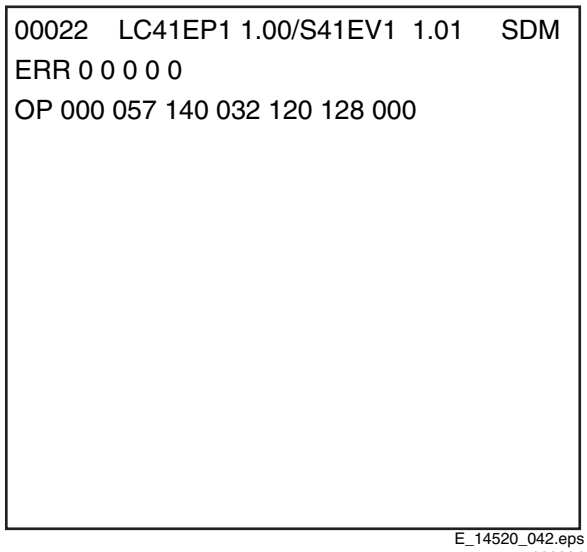


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**Figure 5-2 SDM menu**

***How to navigate***
Use one of the following methods:
- When you press the MENU button on the remote control, the set will switch on the normal user menu in the SDM mode.
- On the TV, press and hold the VOLUME DOWN and press the CHANNEL DOWN for a few seconds, to switch from SDM to SAM and reverse.

***How to exit***

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.
If you turn the television set off by removing the mains (i.e., unplugging the television) without using the mains button, the television set will remain in SDM when mains is re-applied, and the error buffer is not cleared.

### 5.2.2 Service Alignment Mode (SAM)

***Purpose***

- To change option settings.
- To display / clear the error code buffer.
- To perform alignments.

***Specifications***

- Operation hours counter (maximum five digits displayed).
- Software version, Error codes, and Option settings display.
- Error buffer clearing.
- Option settings.
- AKB switching.
- Software alignments (Tuner, White Tone, Geometry & Audio).
- NVM Editor.
- ComPair Mode switching.

***How to enter***

To enter SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: "**062596**" directly followed by the **OSD/ STATUS** button (do not allow the display to time out between entries while keying the sequence).
- Or via ComPair.

After entering SAM, the following screen is visible, with SAM in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.

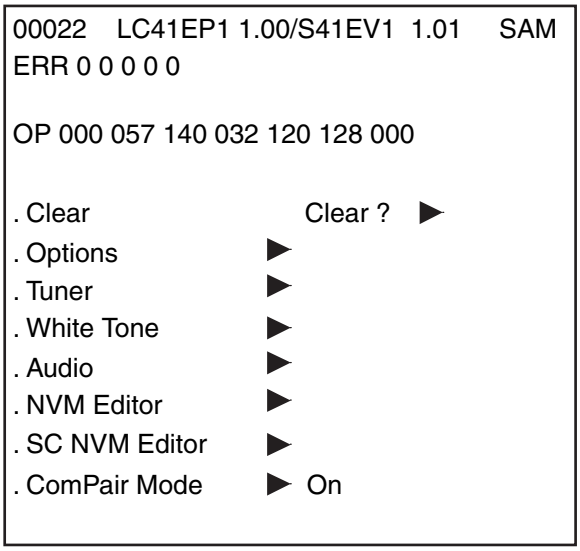


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**Figure 5-3 SAM menu**

***Menu explanation***

1. **LLLLL.** This represents the run timer. The run timer counts normal operation hours, but does not count standby hours.
2. **AAABCD-X.Y.** This is the software identification of the main microprocessor:
   - **A**= the project name (LC41).
   - **B**= the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
   - **C**= the software diversity:
     - **Europe:** T= 1 page TXT, F= Full TXT, V= Voice control.
     - **LATAM and NAFTA:** N= Stereo non-dBx, S= Stereo dBx.
     - **Asian Pacific:** T= TXT, N= non-TXT, C= NTSC.
     - **ALL regions:** M= mono, D= DVD, Q= Mk2.
   - **D**= the language cluster number.
   - **X**= the main software version number (updated with a major change that is incompatible with previous versions).
   - **Y**= the sub software version number (updated with a minor change that is compatible with previous versions).
   - **EEEEEE**= the scaler sw cluster
   - **F**= the main sw version no.
   - **GG**= the sub-version no.
3. **SAM.** Indication of the Service Alignment Mode.
4. **Error Buffer.** Shows all errors detected since the last time the buffer was erased. Five errors possible.
5. **Option Bytes.** Used to set the option bytes. See "Options" in the Alignments section for a detailed description. Seven codes are possible.
6. **Clear.** Erases the contents of the error buffer. Select the CLEAR menu item and press the MENU RIGHT key. The content of the error buffer is cleared.
7. **Options.** Used to set the option bits. See "Options" in the Alignments section for a detailed description.
8. **Tuner.** Used to align the tuner. See "Tuner" in the Alignments section for a detailed description.
9. **White Tone.** Used to align the white tone. See "White Tone" in the Alignments section for a detailed description.
10. **Audio.** No audio alignment is necessary for this television set.
11. **NVM Editor.** Can be used to change the NVM data in the television set. See table "NVM data" further on.
12. **SC NVM Editor.** Can be used to edit Scaler NVM.
13. **ComPalr.** Can be used to switch on the television to In System Programming (ISP) mode, for software uploading via ComPair.
    **Caution:** When this mode is selected without ComPair connected, the TV will be blocked. Remove the AC power to reset the TV.

***How to navigate***

- In SAM, select menu items with the MENU UP/DOWN keys on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, use the MENU UP/DOWN keys to display the next / previous menu items.
- With the MENU LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- In SAM, when you press the MENU button twice, the set will switch to the normal user menus (with the SAM mode still active in the background). To return to the SAM menu press the MENU or STATUS/EXIT button.
- When you press the MENU key in while in a submenu, you will return to the previous menu.

***How to store SAM settings***

To store the settings changed in SAM mode, leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set.

***How to exit***

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.
If you turn the television set "off" by removing the mains (i.e., unplugging the television) without using the mains button, the television set will remain in SAM when mains is re-applied, and the error buffer is not cleared.

#### 5.2.3 Customer Service Mode (CSM)

***Purpose***
The Customer Service Mode shows error codes and information on the TV's operation settings. The call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set. This helps the call centre to diagnose problems and failures in the TV set before making a service call.
The CSM is a read-only mode; therefore, modifications are not possible in this mode.

***How to enter***
To enter CSM, press the following key sequence on the remote control transmitter: "**123654**" (do not allow the display to time out between entries while keying the sequence).

Upon entering the Customer Service Mode, the following screen will appear:

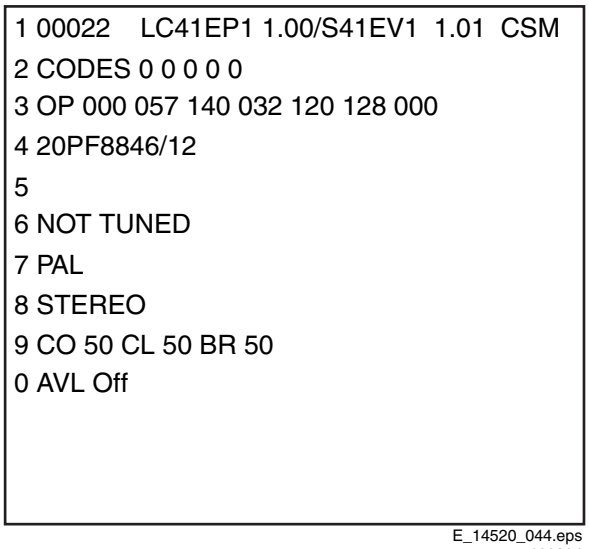


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**Figure 5-4 CSM menu**

***Menu explanation***
1. Indication of the decimal value of the operation hours counter, Software identification of the main microprocessor (see "Service Default or Alignment Mode" for an explanation), and the service mode (CSM= Customer Service Mode).
2. Displays the last five errors detected in the error code buffer.
3. Displays the option bytes.
4. Displays the type number version of the set.
5. Reserved item for P3C call centres (AKBS stands for Advanced Knowledge Base System).
6. Indicates the television is receiving an "IDENT" signal on the selected source. If no "IDENT" signal is detected, the display will read "NOT TUNED"
7. Displays the detected Colour system (e.g. PAL/NTSC).
8. Displays the detected Audio (e.g. stereo/mono).
9. Displays the picture setting information.
10. Displays the sound setting information.

***How to exit***
To exit CSM, use one of the following methods:
- Press the MENU, STATUS/EXIT, or POWER button on the remote control transmitter.
- Press the POWER button on the television set.

## 5.3 Problems and Solving Tips Related to CSM

#### 5.3.1 Picture Problems

**Note**: The problems described below are all related to the TV settings. The procedures used to change the value (or status) of the different settings are described.

***Picture too dark or too bright***

*If:*
- The picture improves when you press the AUTO PICTURE button on the remote control transmitter, or
- The picture improves when you enter the Customer Service Mode,

*Then:*
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys (if necessary) to select BRIGHTNESS.
6. Press the MENU LEFT/RIGHT keys to increase or decrease the BRIGHTNESS value.
7. Use the MENU UP/DOWN keys to select PICTURE.
8. Press the MENU LEFT/RIGHT keys to increase or decrease the PICTURE value.
9. Press the MENU button on the remote control transmitter twice to exit the user menu.
10. The new PERSONAL preference values are automatically stored.

***White line around picture elements and text***

*If:*
The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter,

*Then:*
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select SHARPNESS.
6. Press the MENU LEFT key to decrease the SHARPNESS value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

***Snowy picture***
Check CSM line 6. If this line reads "Not Tuned", check the following:
- Antenna not connected. Connect the antenna.
- No antenna signal or bad antenna signal. Connect a proper antenna signal.
- The tuner is faulty (in this case line 2, the Error Buffer line, will contain error number 10). Check the tuner and replace/ repair the tuner if necessary.

***Black and white picture***

*If:*
- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter,

*Then:*
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select COLOUR.
6. Press the MENU RIGHT key to increase the COLOUR value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

***Menu text not sharp enough***

*If:*
- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter,

*Then:*
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select PICTURE.
6. Press the MENU LEFT key to decrease the PICTURE value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

## 5.4 ComPair

**Note:** Make sure that both the ComPair connector and the UART connector are shielded off with a piece of insulating tape after repair for ESD reasons. Place this tape over the holes in the rear cover of the set.

### 5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:
- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on $I^2C$ level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about $I^2C$ commands yourself because ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the Force/SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

### 5.4.2 Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial (or RS232) cable.
For this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector(s).

The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:
- Automatic (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on $I^2C$/UART level. ComPair can access the $I^2C$/UART bus of the television. ComPair can send and receive $I^2C$/UART commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the $I^2C$/UART buses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the fault finding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some **additional features** like:
- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the (European) Dealer Service Tool (DST).
- If both ComPair and Force/SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink.
  **Example**: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier.*
  – Click on the “Panel” hyperlink to automatically show the PWB with a highlighted capacitor C2568.
  – Click on the “Schematic” hyperlink to automatically show the position of the highlighted capacitor.

### 5.4.3 How To Connect

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with “PC”) of the ComPair interface.
3. Connect the mains adapter to the supply connector (marked with “POWER 9V DC”) of the ComPair interface.
4. Switch the ComPair interface “OFF”.
5. Switch the television set “OFF” with the POWER switch.
6. Connect the ComPair $I^2C$/UART interface cable between the connector on the rear side of the ComPair interface (marked with “$I^2C$” or for UART on the connector marked “VCR”) and the appropriate ComPair connector at the rear side of the TV ($I^2C$ or UART).
   **Note:** Some chassis need an additional $I^2C$ extension cable due to a different connector pitch!

7. Plug the mains adapter in a mains outlet, and switch the interface “ON”. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the “Introduction” chapter.

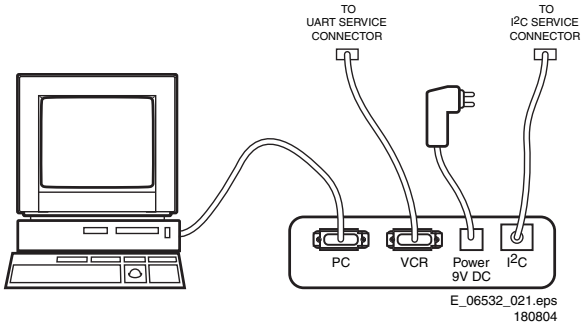



**Figure 5-5 ComPair Interface connection**

#### 5.4.4 How To Order

ComPair order codes (EU/AP/LATAM):
- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631.
- Starter kit ComPair32 software (registration version): 3122 785 60040.
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070 (year 2002, 3122 785 60110 (year 2003).
- SearchMan32 CD (update): 3122 785 60080 (year 2002), 3122 785 60120 (year 2003), 3122 785 60130 (year 2004).
- ComPair $I^2C$ interface cable: 3122 785 90004.
- ComPair firmware upgrade IC: 3122 785 90510.
- Transformer (non-UK): 4822 727 21632.
- Transformer (UK): 4822 727 21633.
- ComPair $I^2C$ extension cable: 3139 131 03791.
- ComPair UART interface cable: 3122 785 90630.

**Note:** If you encounter any problems, contact your local support desk.

## 5.5 Error Codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

#### 5.5.1 How To Read The Error Buffer

You can read the error buffer in 3 ways:
- On screen via the SAM (if you have a picture).
  **Examples:**
  - ERROR: 0 0 0 0 0 : No errors detected
  - ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
  - ERROR: 9 6 0 0 0 : Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See “The Blinking LED Procedure”.
- Via ComPair.

#### 5.5.2 How To Clear The Error Buffer

The error code buffer is cleared in the following cases:
- By using the CLEAR command in the SAM menu:
  - To enter SAM, press the following key sequence on the remote control transmitter: “062596” directly followed by the OSD/STATUS button (do not allow the display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is highlighted. Use the MENU UP/DOWN buttons, if necessary.
  - Press the MENU RIGHT button to clear the error buffer. The text on the right side of the “CLEAR” line will change from “CLEAR?” to “CLEARED”
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

**Note:** If you exit SAM by disconnecting the mains from the television set, the error buffer is not reset.

#### 5.5.3 Error Codes

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures that old error codes are no longer present.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

**Table 5-1 Error code overview**

| Error | Device | Error description | Check item | Diagram |
|---|---|---|---|---|
| 0 | Not applicable | No Error | | |
| 1 | Not applicable | - | - | - |
| 2 | Not applicable | - | - | - |
| 3 | Not applicable | - | - | - |
| 4 | GM5221 | I2C error while communicating with the Genesis Scaler and/or Flash-ROM is faulty/ empty | 7401 7403 | A6 |
| 5 | Not applicable | +5v protection | 7930 | A6 |
| 6 | I2C bus | General I2C error | 7011, 3083, 3084 | A2 |
| 7 | Not applicable | - | - | - |
| 8 | M24C32 | I2C error while communicating with the Scaler EEPROM | 7402 | A7 |
| 9 | M24C16 | I2C error while communicating with the EEPROM | 7099 | A2 |
| 10 | Tuner | I2C error while communicating with the PLL tuner | 1302, 3302, 3303, 3327 | A1 |
| 11 | Not applicable | - | - | - |
| 12 | Not applicable | - | - | - |
| 13 | Not applicable | - | - | - |

## 5.6 The Blinking LED Procedure

Using this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.

When the SDM is entered, the front LED will blink the contents of the error-buffer:
- The Led blinks with as many pulses as the error code number, followed by a time period of 1.5 seconds, in which the Led is off.
- Then this sequence starts is repeated.

Any RC5 command terminates this sequence.

**Example** of error buffer: **12 9 6 0 0**
After entering SDM, the following occurs:
- 1 long blink of 5 seconds to start the sequence,
- 12 short blinks followed by a pause of 1.5 seconds,
- 9 short blinks followed by a pause of 1.5 seconds,
- 6 short blinks followed by a pause of 1.5 seconds,
- 1 long blink of 1.5 seconds to finish the sequence,
- The sequence starts again at 12 short blinks.

## 5.7 Fault Finding and Repair Tips

**Notes:**
- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- Before any fault finding actions, check if the correct options are set.

### 5.7.1 NVM Editor

In some cases, it can be handy if one directly can change the NVM contents. This can be done with the “NVM Editor” in SAM mode.

### 5.7.2 Tuner and IF

***No Picture in RF mode***
1. Check whether picture is present in AV. If not, go to Video processing troubleshooting section.
2. If present, check that the Option settings are correct.
3. Check that all supply voltages are present.
4. Check if I2C lines are working correctly (3.3V).
5. Manually store a known channel and check if there is IF output at Tuner pin 11.
6. Feed in 105 dBuV at Tuner pin 11 and check whether there is RGB output from Video Processing IC. If yes, Tuner may be defected. Change Tuner.

***Sound in picture problem for L' system (rolling horizontal lines)***
1. Check whether AGC L' in Sam mode is set to 0.
2. If yes, align the set to correct value.

***Required system is not selected correctly***
1. Check whether the Service jumper (#4022, 08 05 size) is present. If yes, remove it.
2. Check whether SEL_IF pin is according to what is specified.

### 5.7.3 Video Processing

***No power***
1. Check +12 V and 3V3 at position 1910.
2. If no supply, check the connector 1910.
3. If it is correct, check the power supply board.

***Power supply is correct but no green light***
1. Check the two connectors 1007 and 1008, if they are properly inserted.
2. If they are inserted correctly, check if the 3V3 is present.

***No picture display***
1. Check the RGB signal.
2. If it is present, check pin 3 of IC7006 (NE555).
3. If it has output, the problem is in SCALER part.
4. Otherwise, check H-out on pin 2 of NE555. If the input signal of pin2 is present, but no output, the IC is failed.

**Note**:
- If the H-out (pin 67) doesn’t have signal or the level is low, check the output of NE555 (pin 3) during start up.
- If the H-out (pin 67) has a signal (or has a signal for a very short time), change IC7006 (NE555).

***No TV but PC is present***
1. Check if HSYNC and VSYNC are present at PIN 3 of 7007 and 7005.
2. If they are present, check RGB output.
3. If there is no RGB output, the IC TDA120xx can be failed.

***Comb Filter not working***
1. Check the option bit 5 in SAM.

### 5.7.4 Power Supply

***Check fuses***
This power supply contains three fuses. One is near the mains inlet (marked on the board as 1102) and two other are near the output connectors (marked 1610 and 1660).

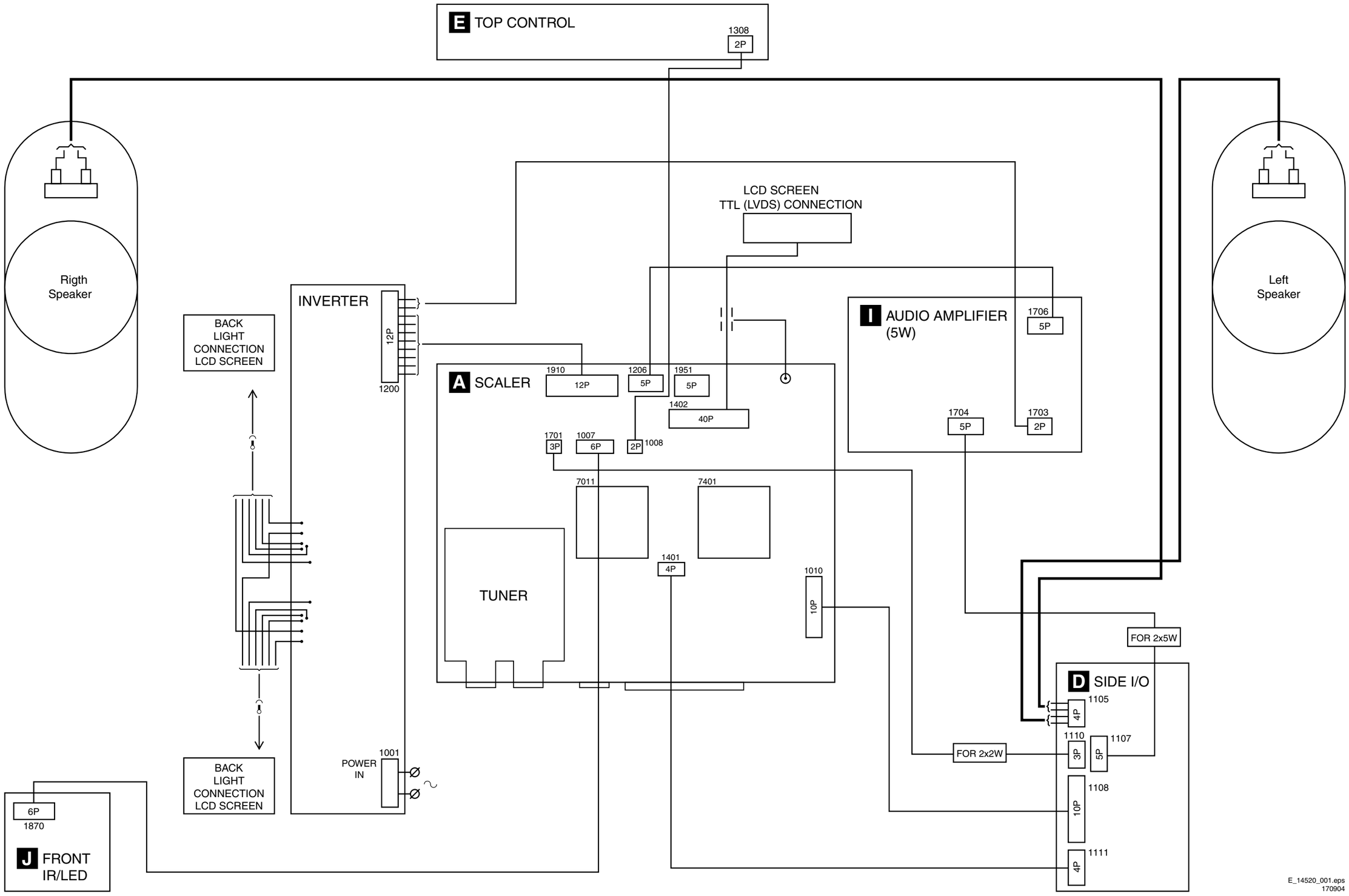
1. Check with power supply in off state by means of ohmic measurement.
2. Fuse 1102 may open in case of severe lightning strikes and/or failures in the power supply. Despite the fact, that this fuse is mounted in a fuse holder and the marking text on the board, it is not meant to be field replaceable.
3. Fuses 1610 and 1660 may open in case a severe overload of the 12 V outputs. Replacement of the power supply is needed, but not before the cause of the overload conditions is resolved.

***Standby mode***
1. Apply a 12 ohm load resistor of sufficient power rating to all outputs (+3 V3, +12 VAL, +12 VL and +24 V). Connect the STBY pin to GND.
2. Over an input voltage range of 90 V_ac to 264 V_ac only the +3 V3 output shall be up and within regulation (±5%). The voltage on the POWER DOWN pin shall be < 0.3 V at an input voltage below 160 V_ac, and 3.3 V ±10% at an input voltage higher than 240 V_ac.

***Normal mode:***
1. Apply a 12 ohm load resistor of sufficient power rating to all outputs (+3 V3, +12 VAL, +12 VL and +24 V). Connect the STBY pin to the +3 V3 output.
2. Over an input voltage range of 90 V _ac to 264 V_ac all outputs shall be up and within regulation (±5%). The voltage on the POWER DOWN pin shall be 3.3 V ±10% over the entire input voltage range. Additionally, the voltage on the big capacitor mounted flat on the PCB shall be 400 V ±10%

# 6. Block Diagrams, Testpoint Overviews, and Waveforms

## Wiring Diagram

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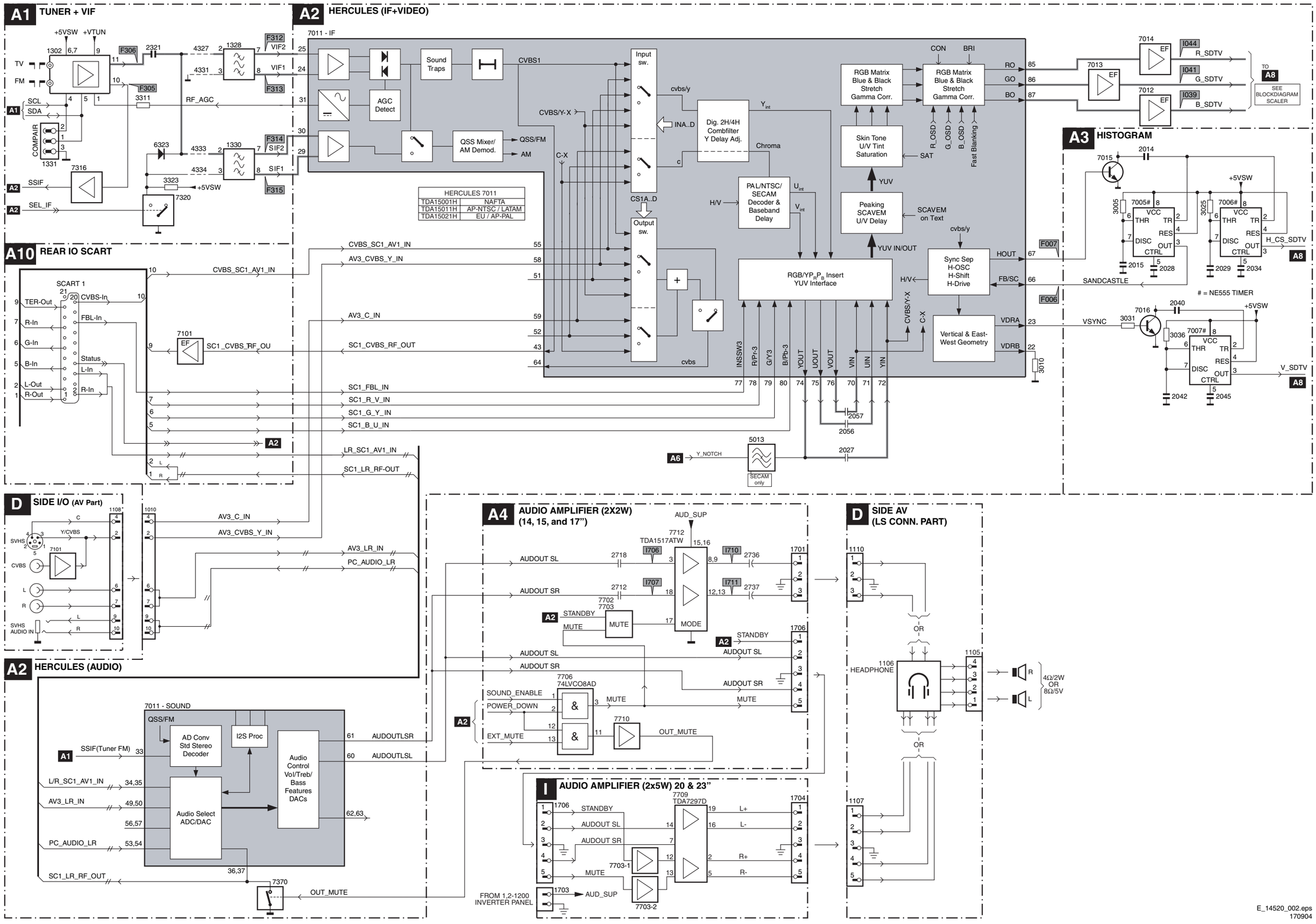
## Block Diagram Audio & Video

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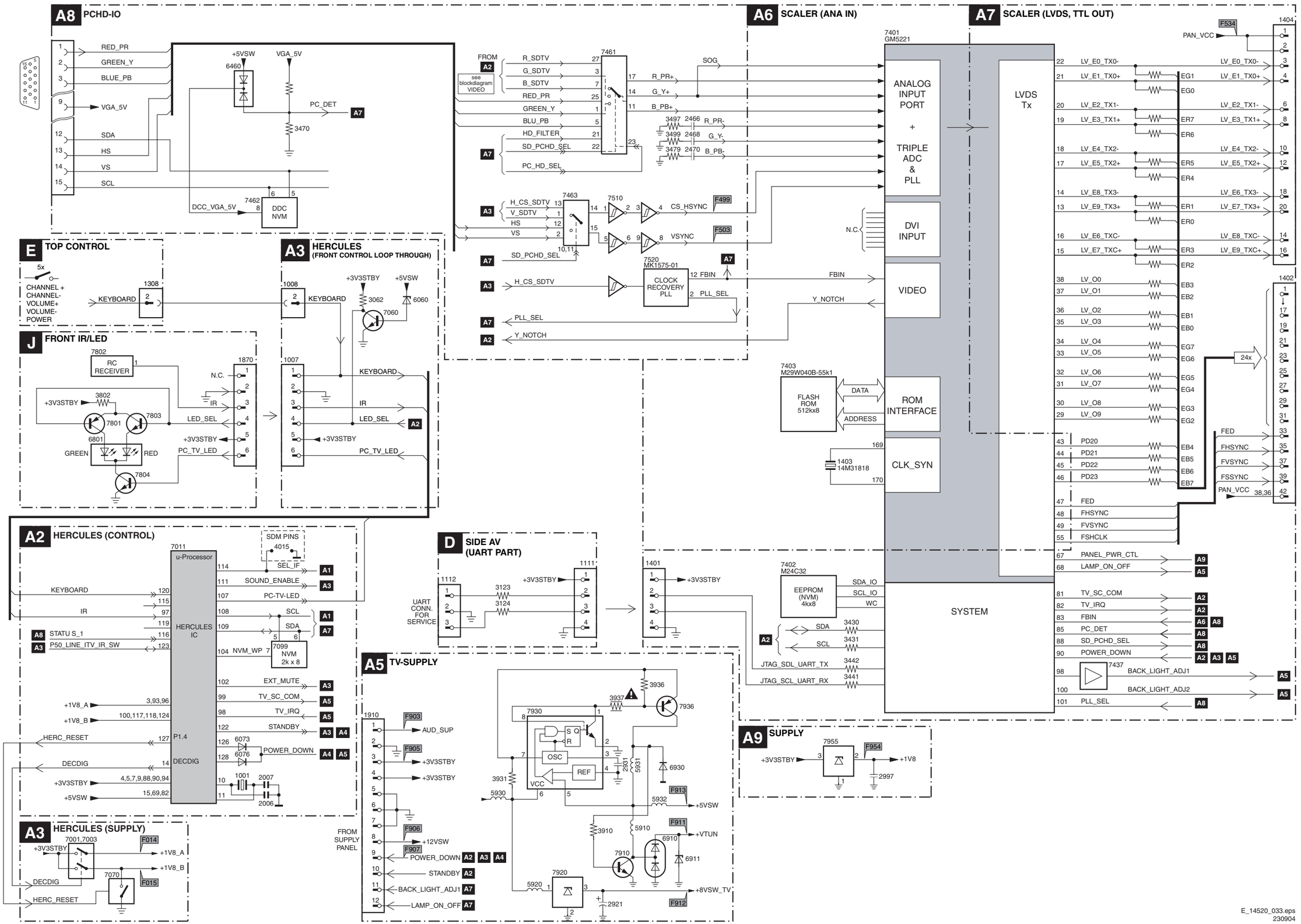
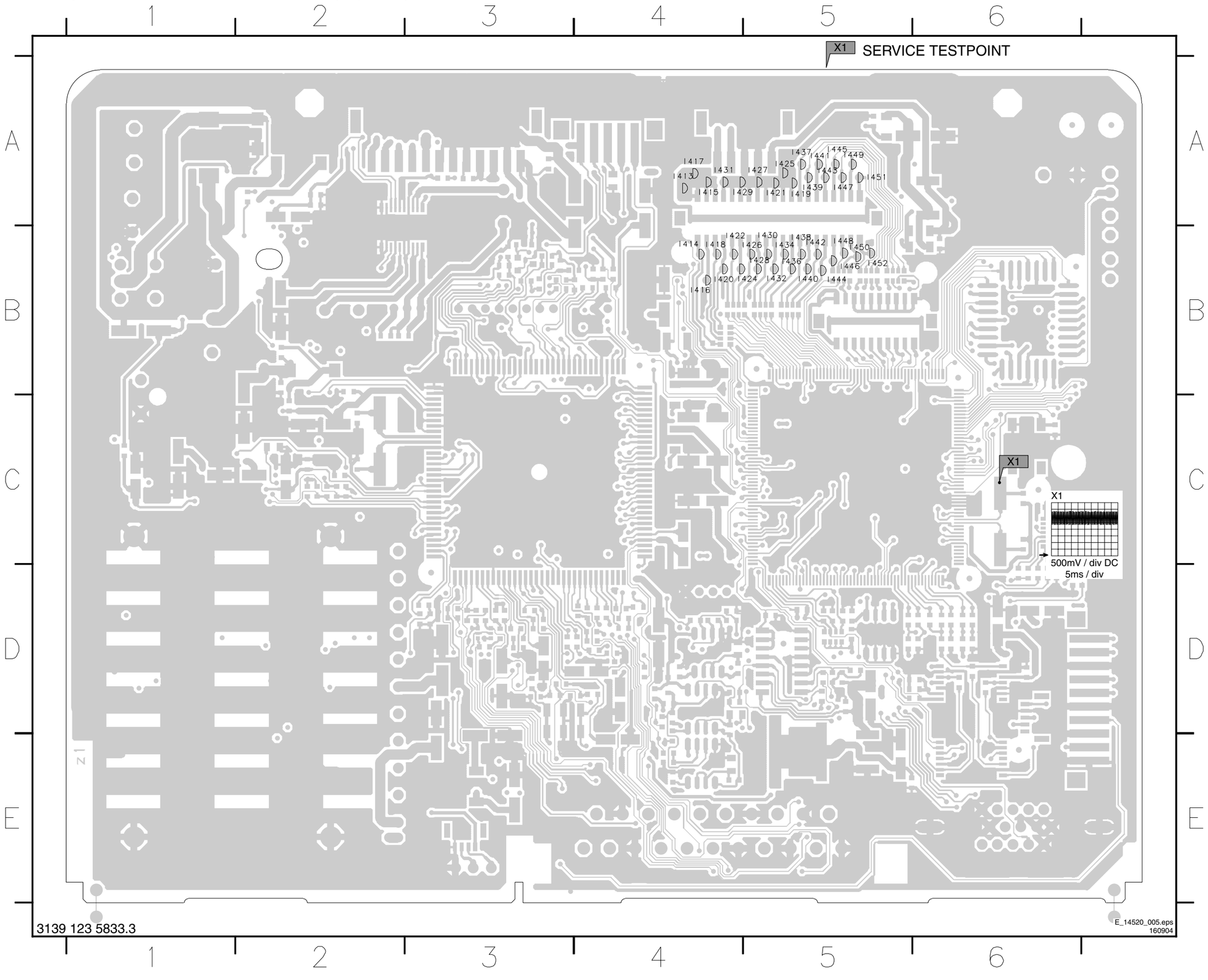
## Block Diagram Scaler & Supply



## Testpoint Overview TV & Scaler Board (Top Side)

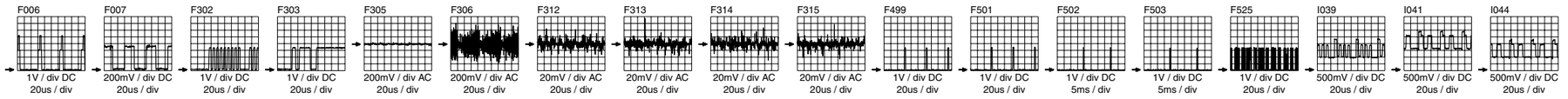



I413 A4
I414 B4
I415 A4
I416 B4
I417 A4
I418 B4
I419 A5
I420 B4
I421 A5
I422 B4
I424 B5
I425 A5
I426 B5
I427 A5
I428 B5
I429 A4
I430 B5
I431 A4
I432 B5
I434 B5
I436 B5
I437 A5
I438 B5
I439 A5
I440 B5
I441 A5
I442 B5
I443 A5
I444 B5
I445 A5
I446 B5
I447 A5
I448 B5
I449 A5
I450 B5
I451 A5
I452 B5

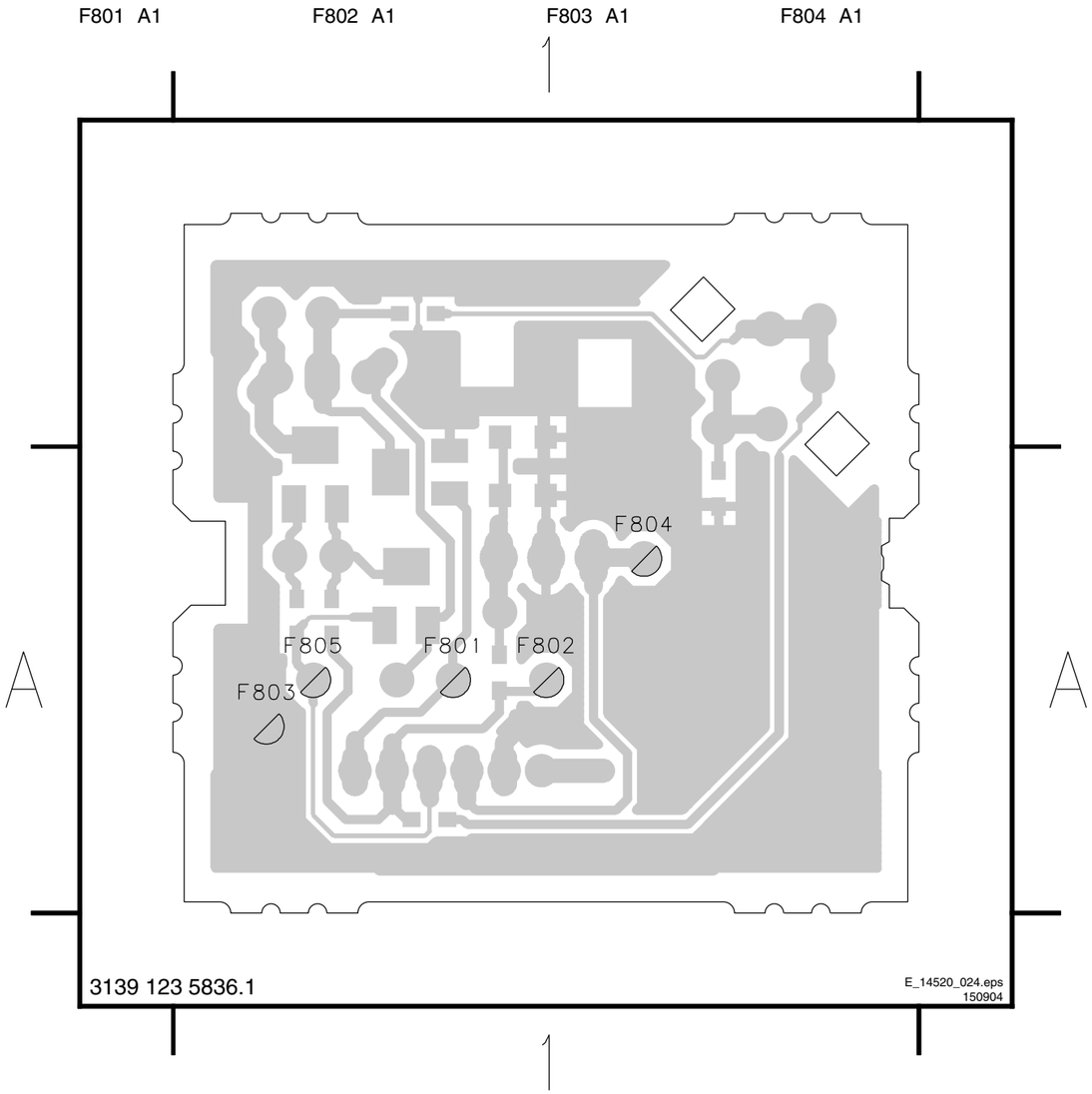
## Testpoint Overview TV & Scaler Board (Bottom Side)


F002 C4 F487 D2 I041 D3 I467 D2
F003 D6 F488 D2 I042 D3 I470 D1
F004 B4 F489 D1 I043 D3 I471 D1
F005 D3 F490 D1 I044 D3 I472 D2
F006 D3 F491 D1 I045 D3 I473 D1
F007 D3 F492 D1 I046 C3 I474 D1
F008 D3 F493 D1 I047 C3 I475 D1
F009 B4 F494 D1 I048 C3 I476 D1
F010 D3 F495 D2 I049 C3 I477 D1
F013 B4 F496 D1 I050 C3 I478 D2
F014 C5 F497 C2 I051 C3 I479 D1
F015 C6 F498 D2 I052 C3 I480 E1
F017 D5 F499 C1 I053 C3 I481 D1
F018 B4 F501 D2 I054 C3 I482 E1
F020 B4 F502 D2 I055 B3 I483 E1
F021 B4 F503 C1 I056 B4 I484 D1
F022 C4 F520 C2 I057 D3 I485 E1
F023 D6 F521 C2 I058 B3 I486 D2
F026 B3 F525 B1 I059 B4 I487 D2
F029 C3 F526 B2 I060 B3 I492 D1
F030 E4 F527 B2 I061 B3 I493 C1
F031 E4 F528 B2 I062 B4 I494 C1
F032 E4 F529 B2 I063 B4 I496 C1
F033 E4 F530 B2 I064 B4 I510 C1
F034 E4 F531 B2 I065 D4 I511 C1
F050 B4 F532 B2 I066 D3 I512 E1
F051 B4 F533 B1 I067 B4 I513 E1
F099 A4 F534 B2 I068 B4 I514 D1
F101 E3 F535 B2 I069 D3 I515 A2
F102 E3 F536 B2 I070 B4 I516 D2
F103 E3 F701 D6 I071 B4 I517 D2
F104 E2 F702 D6 I072 C4 I518 D2
F105 E3 F707 B5 I073 C5 I519 C1
F106 E3 F708 A5 I082 B5 I520 D1
F107 E3 F709 E6 I091 B3 I701 A5
F108 E3 F710 A4 I093 C5 I705 D6
F109 E2 F902 A4 I094 C4 I706 B5
F110 E2 F903 A4 I095 B4 I707 A5
F111 E2 F904 A4 I096 C5 I708 A5
F112 E2 F905 A4 I097 D3 I709 B5
F113 E2 F906 A6 I098 B4 I710 B5
F114 E3 F907 A4 I099 B4 I711 A4
F115 E3 F908 A5 I101 E3 I714 D6
F116 E2 F909 A5 I102 E4 I715 D6
F301 B3 F910 A5 I103 E3 I716 D6
F302 D4 F911 B6 I104 E3 I717 E6
F303 D4 F912 E4 I105 E3 I718 E6
F305 D5 F913 B5 I106 E3 I719 B5
F306 C5 F951 A2 I107 E3 I720 D6
F307 D5 F952 A1 I108 E2 I721 B5
F308 E5 F954 E2 I109 E2 I722 B4
F309 E5 I001 C6 I110 E2 I901 B6
F310 D6 I002 C4 I111 E2 I902 A6
F311 D5 I003 C6 I112 E3 I904 B6
F312 C5 I004 D3 I113 E4 I905 A6
F313 C5 I005 C6 I114 E3 I906 B6
F314 D4 I006 C6 I115 E3 I907 A6
F315 D4 I008 C3 I116 E3 I908 E4
F401 D1 I009 B4 I301 D5 I909 B6
F402 C2 I010 B4 I302 D5 I910 B6
F403 B1 I011 D4 I303 D5 I911 B6
F404 C1 I012 D3 I304 D5 I912 A6
F405 C2 I013 B3 I306 D4 I913 A4
F406 C2 I014 D3 I307 D4 I951 A1
F407 B2 I015 B4 I308 D5 I952 A1
F408 C1 I016 C4 I309 D4 I953 A1
F409 D3 I017 B5 I310 D5 I954 A1
F410 D3 I018 B5 I311 D4 I955 A1
F411 D3 I019 C5 I312 E5 I956 D2
F412 D3 I020 C4 I313 D5 I957 E1
F413 C1 I021 C4 I371 D4
F414 B1 I022 C5 I401 C2
F415 B1 I023 C5 I402 D2
F416 C1 I024 C5 I403 B1
F417 C2 I025 C5 I404 B1
F455 C2 I026 C4 I405 D2
F456 C2 I027 C3 I406 D2
F457 C3 I028 C4 I407 D2
F471 E2 I029 D4 I408 D2
F472 D2 I030 D4 I409 B3
F473 D2 I031 D4 I410 B2
F474 E1 I032 C3 I411 C2
F475 E1 I033 C3 I412 C2
F476 E1 I034 D3 I433 B3
F477 E1 I035 D3 I435 B2
F479 D1 I036 D3 I462 E1
F480 D2 I037 C3 I463 E1
F481 D2 I038 D3 I464 D1
F482 D2 I039 D3 I465 D1
F483 D2 I040 E3 I466 D2

F014 = 1V8 DC
F015 = 1V8 DC
F404 = 3V3 DC
F405 = 1V8 DC
F406 = 1V8 DC
F407 = 3V3 DC
F903 = 0V DC
F905 = 3V3 DC
F906 = 14V3 DC
F907 = 3V3 DC
F911 = 33V DC
F912 = 8V1 DC
F913 = 5V4 DC
F951 = 12V DC
F954 = 1V8 DC



## Testpoint Overview Front IR / LED Panel (Bottom Side)




***Personal Notes:***

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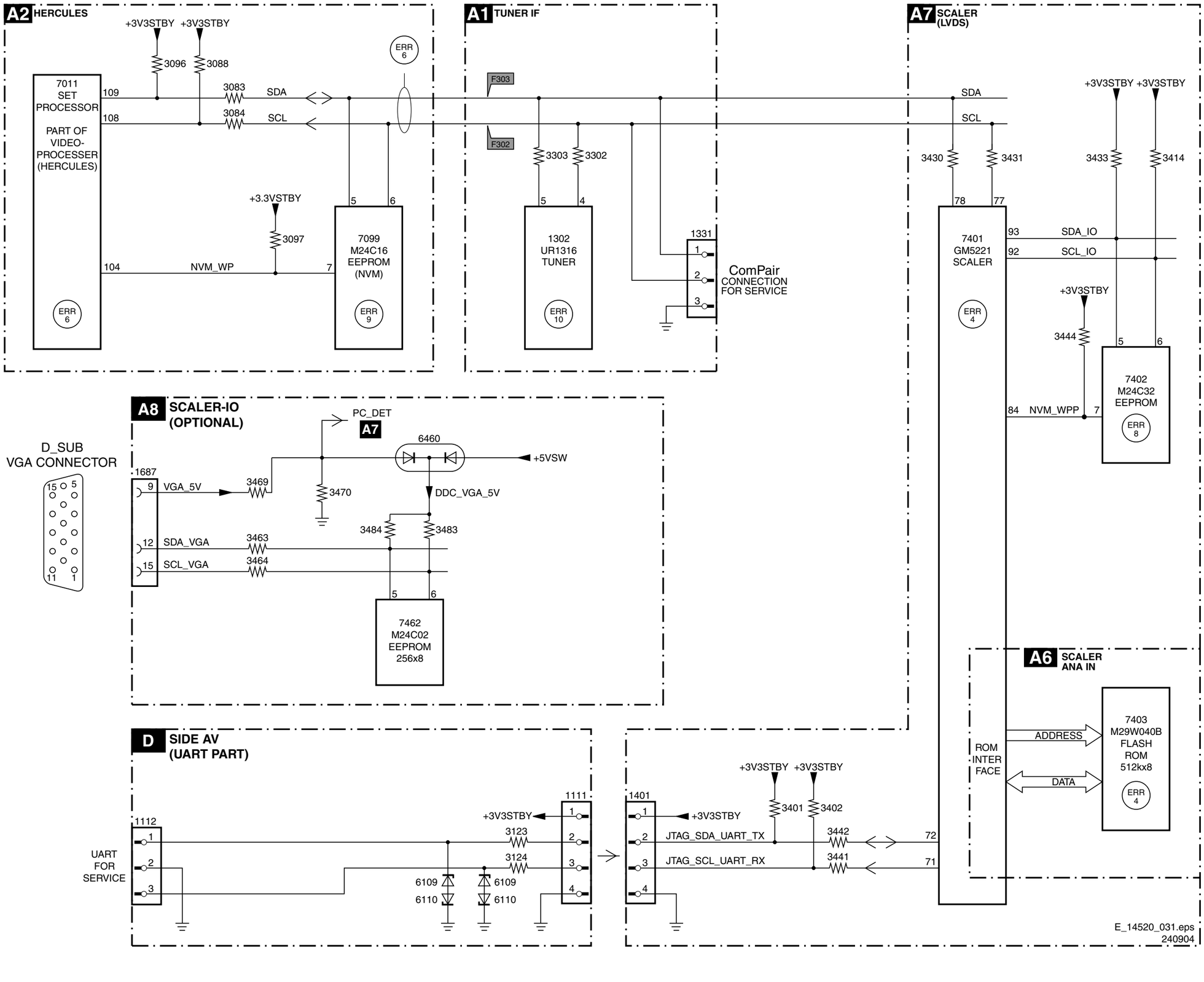
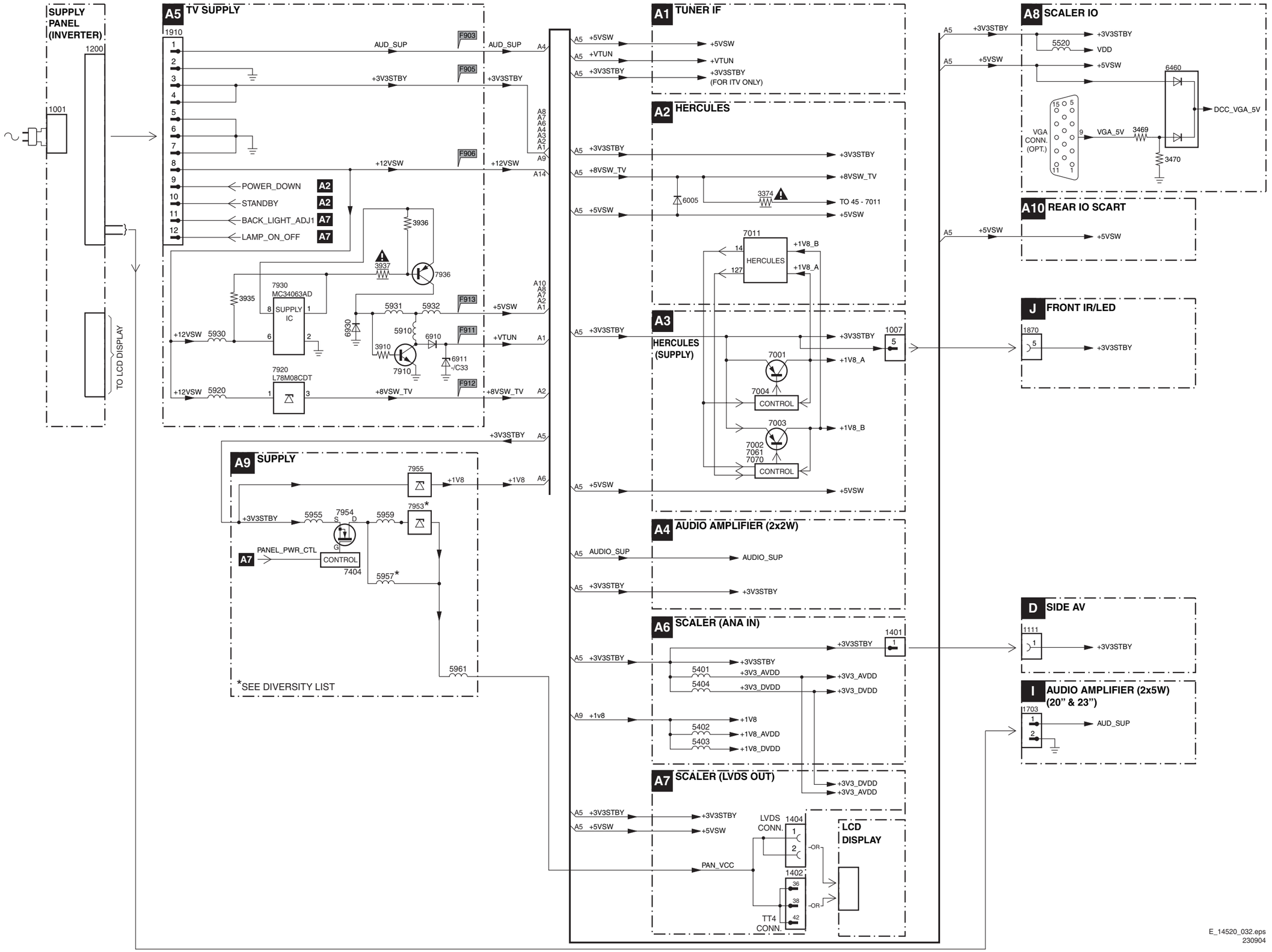
060804

## I2C IC Overview

# I2C BUS INTERCONNECTION DIAGRAM



## Supply Voltage Overview

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230904

# 7. Circuit Diagrams and PWB Layouts

## TV & Scaler Board: Tuner & VIF

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1302 A2 | 1331 B1 | 2307 D4 | 2313 E5 | 2321 C6 | 3309 B6 | 3316 E6 | 3321 C7 | 3325 C7 | 4318 E7 | 4331 C8 | 4337 C9 | 5321 C6 | 6310 B6 | 7316 E6 | F302 C2 | F307 C3 | F311 E6 | F315 E10 | I304 E6 | I309 C7 | I313 C3 |
| 1328 B9 | 1332 A1 | 2308 D4 | 2314 E5 | 2324 B7 | 3311 C6 | 3317 E6 | 3322 C7 | 3326 D7 | 4327 B8 | 4333 E8 | 4338 C9 | 5324 B7 | 6311 C6 | 7320 D6 | F303 C2 | F308 B5 | F312 D10 | I301 C4 | I306 B7 | I310 D6 | S301 C1 |
| 1329 D9 | 2302 C3 | 2309 B6 | 2317 E6 | 3302 C2 | 3314 E6 | 3319 D6 | 3323 C7 | 3327 C4 | 4328 B8 | 4334 E8 | 4339 C3 | 5339 B9 | 6323 C7 | 7325 D7 | F305 A5 | F309 D2 | F313 E10 | I302 E5 | I307 C7 | I311 D7 | S302 C2 |
| 1330 E9 | 2303 C3 | 2311 C5 | 2318 E6 | 3303 C2 | 3315 E6 | 3320 D6 | 3324 C7 | 4312 E5 | 4329 C8 | 4336 E8 | 5309 B6 | 5340 E9 | 6324 C7 | F301 B2 | F306 A5 | F310 D2 | F314 E10 | I303 E6 | I308 C7 | I312 C3 | |

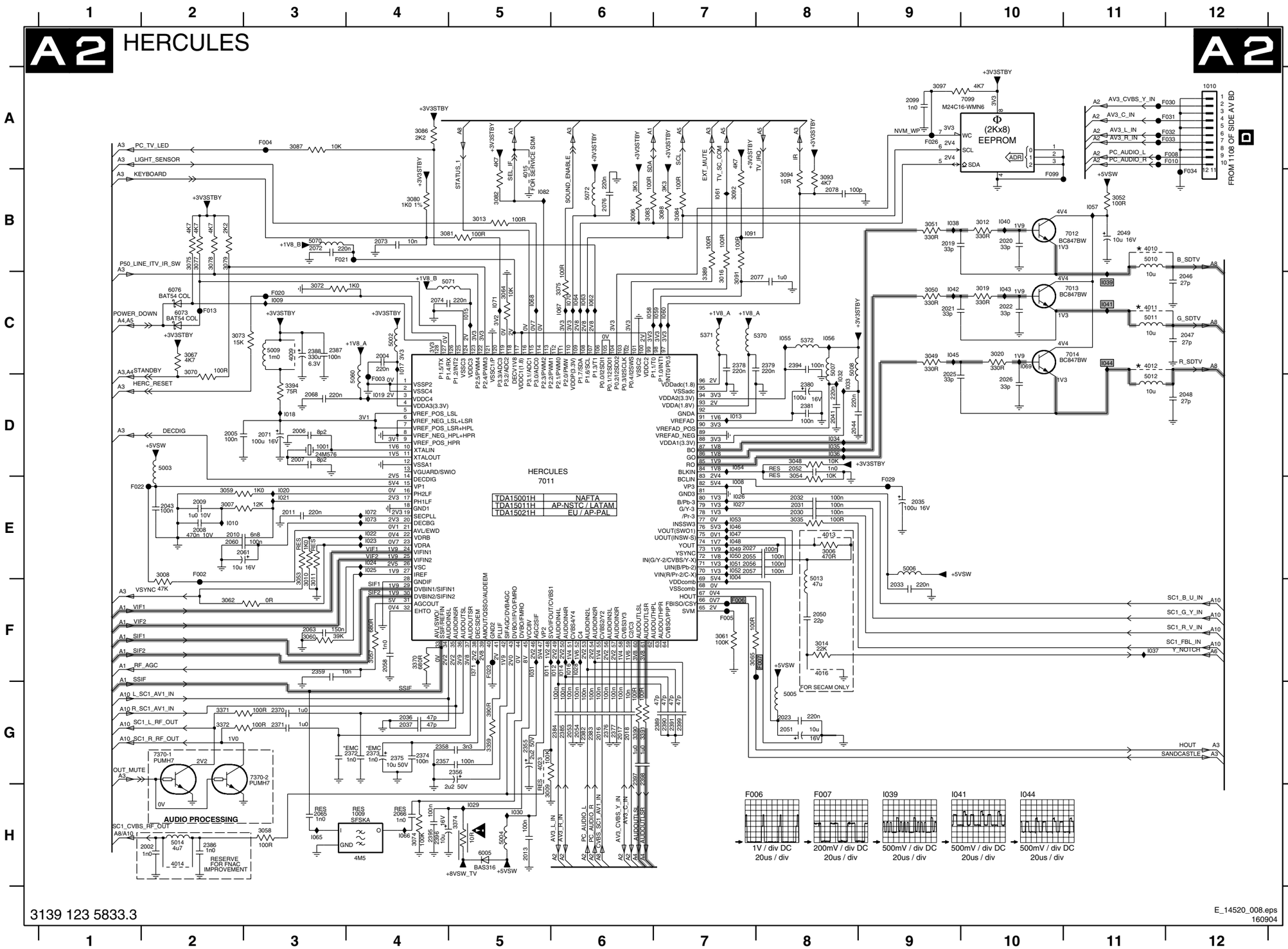



| | * 1302 |
|---|---|
| PAL / SECAM | UR1316 |
| NTSC / LATAM | UR1336 |

| * | EU | AP | CHINA | NAFTA |
|---|---|---|---|---|
| 4327 | Y | Y | -- | Y |
| 4328 | -- | -- | Y | -- |
| 4329 | -- | Y | -- | -- |
| 4331 | Y | -- | Y | -- |
| 4333 | Y | Y | Y | -- |
| 4334 | Y | -- | -- | -- |
| 4336 | -- | Y | Y | -- |
| 4337 | -- | -- | Y | -- |
| 4338 | -- | -- | Y | -- |
| 4339 | -- | -- | -- | -- |

| | * 1328 | * 1329 | * 1330 |
|---|---|---|---|
| EUROPE | OFWK3953L | -- | OFWK9656L |
| AP | OFWK7265L | -- | OFWK9361L |
| CHINA | OFWK3956L | OFWK9355L | OFWK9352L |
| NAFTA | OFWM1967L | -- | -- |

## TV & Scaler Board: Hercules




3139 123 5833.3

| | | |
|---|---|---|
| 1001 D3 | 3070 D2 | I038 B9 |
| 1009 H4 | 3072 C3 | I039 C11 |
| 1010 A12 | 3073 C2 | I040 B10 |
| 2002 H2 | 3074 H4 | I041 C11 |
| 2004 C4 | 3075 B2 | I042 C9 |
| 2005 D2 | 3077 B2 | I043 C10 |
| 2006 D3 | 3078 B2 | I044 C11 |
| 2007 D3 | 3079 B2 | I045 C9 |
| 2008 E2 | 3080 B4 | I046 E7 |
| 2009 E2 | 3081 B4 | I047 E7 |
| 2010 E2 | 3082 B5 | I048 E7 |
| 2011 E3 | 3083 B6 | I049 E7 |
| 2013 H5 | 3084 B7 | I050 E7 |
| 2016 G6 | 3086 A4 | I051 E7 |
| 2017 G6 | 3087 A3 | I052 E7 |
| 2018 G6 | 3088 B7 | I053 E7 |
| 2019 B9 | 3091 C7 | I054 D7 |
| 2020 B10 | 3092 B7 | I055 C8 |
| 2021 C9 | 3093 B8 | I056 C8 |
| 2022 C10 | 3094 B8 | I057 B11 |
| 2023 G8 | 3096 B6 | I058 C6 |
| 2025 C9 | 3097 A9 | I059 C7 |
| 2026 D10 | 3359 G5 | I060 C7 |
| 2027 E7 | 3370 F4 | I061 B7 |
| 2030 E8 | 3371 G2 | I062 C6 |
| 2031 E8 | 3372 G2 | I063 C6 |
| 2032 E8 | 3374 H5 | I064 C6 |
| 2033 F9 | 3375 C6 | I065 H3 |
| 2035 E9 | 3389 C7 | I066 H4 |
| 2036 G4 | 3390 G6 | I067 C6 |
| 2037 G4 | 3391 G6 | I068 C5 |
| 2041 D8 | 3394 D3 | I069 C10 |
| 2043 E2 | 4009 C3 | I070 C6 |
| 2044 D8 | 4010 B11 | I071 C5 |
| 2046 C12 | 4011 C11 | I072 E4 |
| 2047 C12 | 4012 C11 | I073 E4 |
| 2048 D12 | 4013 E8 | I082 B5 |
| 2049 B11 | 4014 H2 | I091 B7 |
| 2050 F8 | 4015 B5 | I371 F5 |
| 2051 G8 | 4016 F8 | |
| 2052 D8 | 4023 C5 | |
| 2053 G6 | 5002 C4 | |
| 2054 G6 | 5003 D2 | |
| 2055 E7 | 5004 H5 | |
| 2056 E7 | 5005 G8 | |
| 2057 E7 | 5006 E9 | |
| 2058 F4 | 5007 C8 | |
| 2060 E2 | 5008 C8 | |
| 2061 E3 | 5009 C3 | |
| 2063 F3 | 5010 B11 | |
| 2065 H3 | 5011 C11 | |
| 2066 H4 | 5012 D11 | |
| 2068 D3 | 5013 E8 | |
| 2071 D3 | 5014 H2 | |
| 2072 B3 | 5060 D4 | |
| 2073 B4 | 5070 B3 | |
| 2074 C4 | 5071 C5 | |
| 2076 B6 | 5072 B6 | |
| 2077 C6 | 5370 C8 | |
| 2078 B8 | 5371 C7 | |
| 2099 A9 | 5372 C8 | |
| 2355 G5 | 6005 H5 | |
| 2356 G5 | 6073 C2 | |
| 2357 G4 | 6076 C2 | |
| 2358 G4 | 7011 E5 | |
| 2359 F3 | 7012 B11 | |
| 2370 G3 | 7013 C11 | |
| 2371 G3 | 7014 C11 | |
| 2372 G4 | 7099 A10 | |
| 2373 G4 | 7370-1 G2 | |
| 2374 G4 | 7370-2 G3 | |
| 2375 G4 | F002 E2 | |
| 2376 G6 | F003 D4 | |
| 2377 G6 | F004 A3 | |
| 2378 C7 | F005 F7 | |
| 2379 C8 | F006 F7 | |
| 2380 D8 | F007 F8 | |
| 2381 D8 | F008 A12 | |
| 2382 G6 | F010 A12 | |
| 2383 G6 | F013 C2 | |
| 2384 G6 | F020 C3 | |
| 2385 G6 | F021 B3 | |
| 2386 H2 | F022 E1 | |
| 2387 C3 | F023 F5 | |
| 2388 C3 | F026 A9 | |
| 2389 G7 | F029 E9 | |
| 2390 G7 | F030 A12 | |
| 2391 G7 | F031 A12 | |
| 2394 C8 | F032 A12 | |
| 2395 H4 | F033 A12 | |
| 2396 H4 | F034 B12 | |
| 2397 G6 | F099 B10 | |
| 2398 G6 | I004 E7 | |
| 2399 G7 | I008 E7 | |
| 3006 E8 | I009 C3 | |
| 3007 E2 | I010 E2 | |
| 3008 E2 | I011 F5 | |
| 3009 H5 | I012 F6 | |
| 3010 F3 | I013 D7 | |
| 3011 F3 | I014 F6 | |
| 3012 B10 | I015 C5 | |
| 3013 B5 | I016 F6 | |
| 3014 F8 | I017 C4 | |
| 3016 C7 | I018 D3 | |
| 3019 C10 | I019 D4 | |
| 3020 C10 | I020 E3 | |
| 3035 E8 | I021 E3 | |
| 3048 D8 | I022 E4 | |
| 3049 C9 | I023 E4 | |
| 3050 C9 | I024 E4 | |
| 3051 B9 | I025 E4 | |
| 3052 B11 | I026 E7 | |
| 3053 F3 | I027 E7 | |
| 3054 E8 | I028 F6 | |
| 3057 F4 | I029 H5 | |
| 3058 H3 | I030 H5 | |
| 3059 E2 | I031 F5 | |
| 3060 F3 | I032 D8 | |
| 3061 F7 | I033 D8 | |
| 3062 F2 | I034 D8 | |
| 3064 C5 | I035 D8 | |
| 3065 F7 | I036 D8 | |
| 3067 C2 | I037 F11 | |

## TV & Scaler Board: Hercules Supply

# A3 HERCULES-SUPPLY

TO 1308 OF TOP CNTL BD
TO 1870 OF FRONT IR/LED BD
I57 ITV INTERFACE
1008
1007
1006
*EMC 2067 1n0
3063 2K2
6060 BZX384-C2V7
7060 PDTC114ET
I099
F017
F018 KEYBOARD A2
F009 IR A2
I098 LED_SEL A2
PC_TV_LED A2
LIGHT_SENSOR A2
F050
F051
P50_LINE_ITV_IR_SW A2
3001 1R0
3002 22K
3003 1R0
3004 22K
I006
I005
I003
I001
7001 BC807-25
7003 BC807-25
7004 BC847BW
7002 BC847BW
F014
F015
2012 16V 100u
2024 16V 100u
I096
3066 4K7
2082 1u0
I002
3024 4K7
2001 220n
2083 10u
7061 BSH103
7070 BSH103
I093
6061 BAS316
I095 HERC_RESET A2
3089 150K
2079 22n
I094 DECDIG A2
SANDCASTLE
RES 3076 2K2
3005 2K2
3022 1K0
3023 10K
6002 BAS316
2014 100p
I097
7015 BC847B
3021 820R
3037 68K
3025 2K7
2028 10n
7005 NE555D COMP
2003 47u 16V
3036 56K
2045 10n
7007 NE555D COMP
3027 10K
3028 4K7
2015 3n3
2042 3n3
3055 1K0
V_SDTV A8
3056 4K7
3026 820R
2034 10n
7006 NE555D COMP
3033 100K
3034 220K
6006 BAS316
2040 220p
7016 BC847B
3031 470R
3032 1K8
RES 3038
RES 4002
2029 3n3
3029 1K0
3030 4K7
H_CS_SDTV A8
RES 4001
HOUT A2
VSYNC A2
F014 = 1V9 DC
F015 = 1V9 DC
E_14520_009.eps 170904

1006 B1
1007 B1
1008 A1
2001 B7
2003 C4
2012 B5
2014 C1
2015 E4
2024 B5
2028 D2
2029 F4
2034 E2
2040 E5
2042 E6
2045 D5
2067 A2
2079 A8
2082 B6
2083 B7
3001 A4
3002 A4
3003 A5
3004 A5
3005 C1
3021 D1
3022 C1
3023 C1
3024 B6
3025 C2
3026 E2
3027 D4
3028 D4
3029 F4
3030 F4
3031 F4
3032 F5
3033 E5
3034 E5
3036 C4
3037 D1
3038 F5
3055 E6
3056 E7
3063 A3
3066 B6
3076 C1
3089 A8
4001 F1
4002 F6
6002 C2
6006 E5
6060 A3
6061 A9
7001 A4
7002 B5
7003 A5
7004 B4
7005 D3
7006 E3
7007 D5
7015 D1
7016 E5
7060 B3
7061 A7
7070 A8
F009 B2
F014 B4
F015 B4
F017 B2
F018 B2
F050 C2
F051 C2
I001 A5
I002 B6
I003 A5
I005 A4
I006 A4
I093 A8
I094 A9
I095 A9
I096 B6
I097 D1
I098 B2
I099 B3

## TV & Scaler Board: Audio Amplifier (2x2W)

# A 4 AUDIO AMPLIFIER (2x2W)

**FOR 14, 15, 17 INCH**

AUDIO AMP 2 X 2W

7712 TDA1517ATW

AUD_SUP (10V)

2719 100n P_GND

2714 470u 16V P_GND

VP1 VP2

POWER AMPLIFIER

A2 AUDOUTLSL F707 — 3744 100R — I719 — 2718 1u0 — I706 — *EMC 2742 470p — IN1+

A2 AUDOUTLSR F708 — 3745 100R — I701 — 2712 1u0 — I707 — *EMC 2741 470p — IN2-

3727 10K

3726 10K

OUT1A OUT1B — OUT1 — I710 — 2736 470u 16V — I721 — 1701 1 L, 2 GND, 3 R — TO 1110 OF SIDE AV D

OUT2A OUT2B — OUT2 — I711 — 2737 470u 16V — I722

EMC 2738 1n0

EMC 2739 1n0

P_GND

MODE

SVRR — I709 — 2724 100u 16V

NC

PGND

SGND HS

F710 P_GND

+3V3STBY — 3719 10K — I720 — 3V3

AUD_SUP — 3717 10K — 11V2

7702 BC847BW — 3V2

I714 — 3706 10K — I708

+3V3STBY — 3725 10K — 7703 BC847BW — I715 11V2

3722 8K2

2703 10u 16V — 2704 1u0 — 2705 1u0

3V3 — I705

A2 STANDBY — * 4703 — 3V3 — I716

4X AND GATES +3V3STBY

7706-1 74LVC08AD

A2 SOUND_ENABLE F701 — 3V3 — 1

A2 POWER_DOWN A2,A4,A5 — 3V3 — 2 — 3 — 3V3

7706-2 74LVC08AD — 4 — 5 — 6 — 3V3

7706-3 74LVC08AD — 9 — 10 — 8

7706-4 74LVC08AD — 12 — 13 — 11 — 3V3

A2 EXT_MUTE F702 — 3V3

* 4704

+3V3STBY — 3730 3K3 — 0V — F709 OUT_MUTE A2

I718 — 3732 1K0 — I717 — 0V7 — 7710 BC847BW

1706

A2 STANDBY — 3V2 — 1

A2 AUDOUTLSL — 0V — 2

A2 AUDOUTLSR — 0V — 3

3V3 — 4

5 — TO 1706 OF AUD AMP 2X5W I

MUTE — 5706

**FOR 20, 23 INCH**

| * | |
|---|---|
| 4703 | RES |
| 4704 | RES |

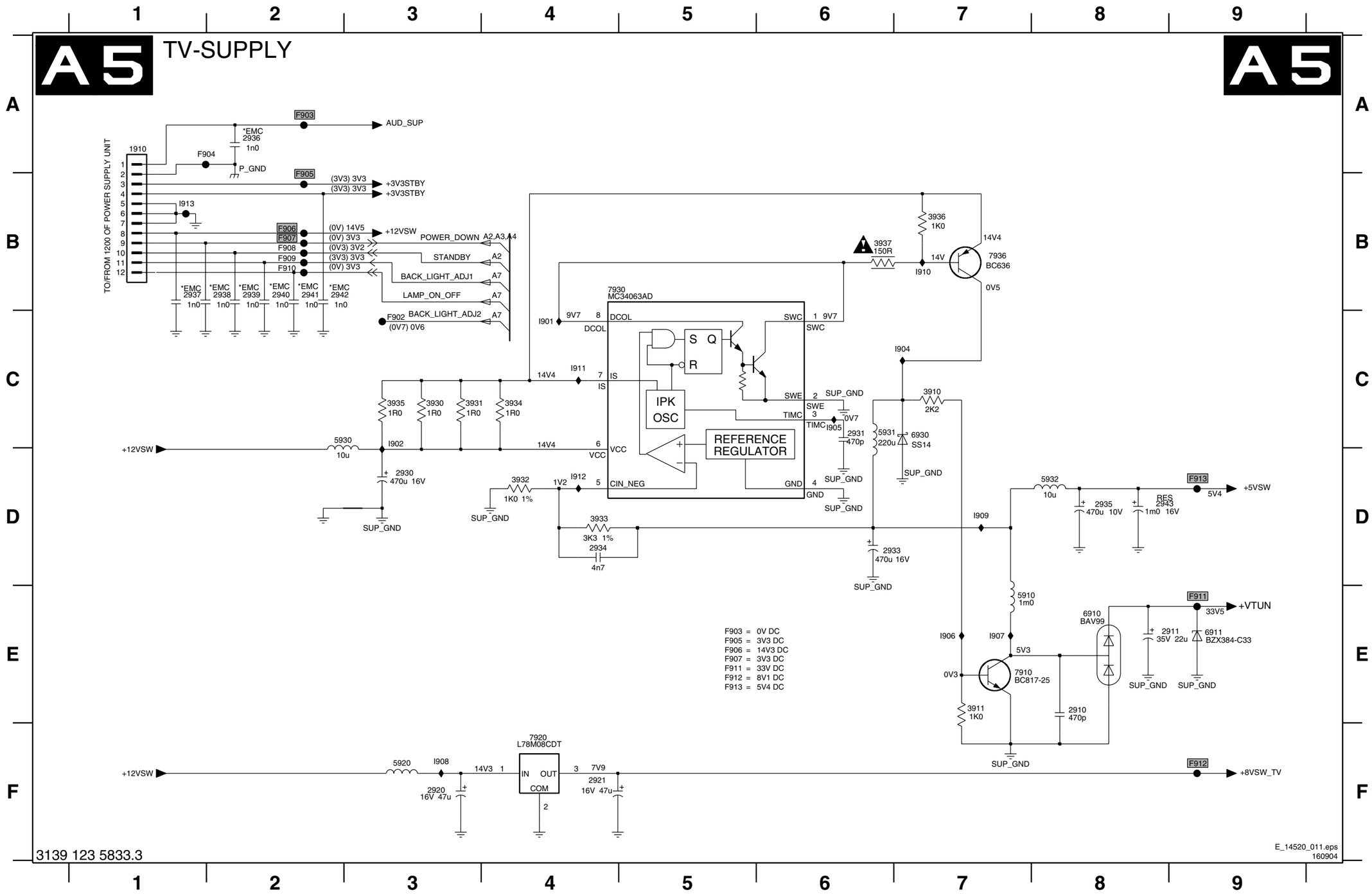
E_14520_010.eps 160904

3139 123 5833.3

1701 B8
1706 D5
2703 C3
2704 C4
2705 C4
2712 B3
2714 A6
2718 B3
2719 A5
2724 C5
2736 B6
2737 B6
2738 B7
2739 B7
2741 C4
2742 B4
3706 C3
3717 C2
3719 C2
3722 C3
3725 C2
3726 C3
3727 B3
3730 E3
3732 F3
3744 B1
3745 B1
4703 D2
4704 F2
5706 D5
7702 C2
7703 C3
7706-1 D2
7706-2 E2
7706-3 E2
7706-4 F2
7710 F3
7712 B5
F701 D1
F702 F1
F707 B1
F708 C1
F709 E3
F710 C6
I701 B2
I705 D3
I706 B4
I707 B4
I708 C4
I709 B5
I710 B6
I711 B6
I714 C3
I715 C3
I716 D3
I717 F3
I718 F2
I719 B2
I720 C2
I721 B7
I722 B7

## TV & Scaler Board: TV Supply

# A5 TV-SUPPLY




3139 123 5833.3

E_14520_011.eps
160904

1910 A1
2910 E8
2911 E9
2920 F3
2921 F4
2930 D3
2931 C6
2933 D6
2934 D4
2935 D8
2936 A2
2937 B1
2938 B2
2939 B2
2940 B2
2941 B2
2942 B2
2943 D8
3910 C7
3911 E7
3930 C3
3931 C3
3932 D4
3933 D4
3934 C4
3935 C3
3936 B7
3937 B6
5910 E7
5920 F3
5930 C2
5931 C6
5932 D8
6910 E8
6911 E9
6930 C7
7910 E7
7920 F4
7930 B4
7936 B7
F902 C3
F903 A2
F904 A1
F905 B2
F906 B2
F907 B2
F908 B2
F909 B2
F910 B2
F911 E9
F912 F9
F913 D9
I901 C4
I902 C3
I904 C7
I905 C6
I906 E7
I907 E7
I908 F3
I909 D7
I910 B7
I911 C4
I912 D4
I913 B1

## TV & Scaler Board: Scaler

# A6 SCALER

A6

7401-7 GM5221 ROM INTERFACE

7403 M29W040B-55K1 ROM 512Kx8 [FLASH]

7401-1 GM5221 ANA-IN

7401-6 GM5221 SUPPLY

7401-2 GM5221 DVI

7401-9 GM5221 VIDEO

7401-5 GM5221 NC

7401-3 GM5221 CLK-SYN

| ★ | 14" | 15" | 17" | 20" | 23" |
|---|---|---|---|---|---|
| 3425 | -- | -- | Y | -- | -- |
| 3426 | -- | -- | -- | -- | Y |
| 3427 | -- | -- | Y | Y | -- |
| 3428 | -- | Y | -- | Y | -- |

F404 = 3V3 DC
F405 = 1V8 DC
F406 = 1V8 DC
F407 = 3V3 DC

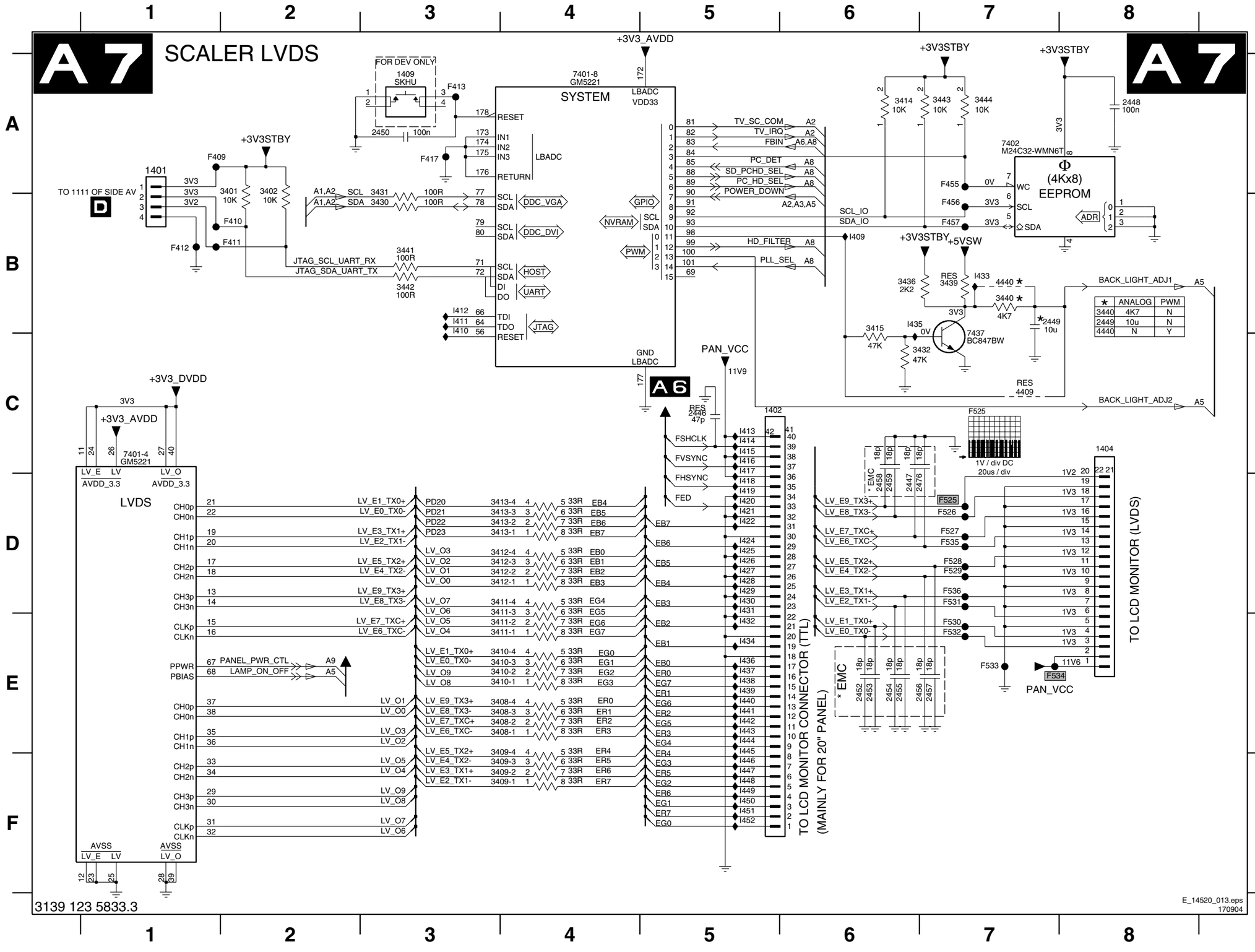
X1 500mV / div DC, 5ms / div

3139 123 5833.3

E_14520_012.eps 160904

1403 G5
1405 E2
1406 D2
1407 D2
2401 D9
2402 G10
2403 D9
2404 G10
2405 G10
2406 G11
2407 D9
2408 D10
2409 D10
2410 D10
2411 D10
2412 D10
2413 D11
2414 D11
2415 D11
2416 D11
2417 D12
2418 D12
2419 D12
2420 E9
2421 E9
2422 E9
2423 E9
2424 E10
2425 E10
2426 E10
2427 E10
2428 F9
2429 F9
2430 F9
2431 F9
2432 F10
2433 F10
2434 F10
2435 F10
2436 F10
2437 G9
2438 G9
2439 G9
2440 G9
2441 G10
2442 G10
2443 G4
2444 G5
2445 C4
3403 E6
3404 E3
3405 E3
3406 E3
3407-1 G2
3407-2 G2
3407-3 G2
3407-4 G2
3416 E6
3417 C2
3418 C2
3419 C2
3420 C2
3421 C2
3422 D2
3423 D2
3424-1 F7
3424-2 F8
3424-3 F8
3424-4 F8
3425 G7
3426 G8
3427 G8
3428 G8
3429 D2
3433 D2
3434 D2
3435 F7
5401 C9
5402 E9
5403 F9
5404 G9
7401-1 A8
7401-2 C8
7401-3 G5
7401-5 F3
7401-6 B10
7401-7 A4
7401-9 F6
7403 C4
F401 G4
F402 D8
F403 E3
F404 D9
F405 E9
F406 F9
F407 G9
F408 E7
F414 D2
F415 E2
F416 C11
I401 E7
I402 F7
I403 D2
I404 D2
I405 F7
I406 F7
I407 F7
I408 F7

## TV & Scaler Board: Scaler LVDS




1401 A1
1402 C5
1404 C8
1409 A3
2446 C5
2447 D6
2448 A8
2449 B7
2450 A3
2452 E6
2453 E6
2454 E6
2455 E6
2456 E7
2457 E7
2458 D6
2459 D6
2476 D7
3401 A2
3402 A2
3408-1 E4
3408-2 E4
3408-3 E4
3408-4 E4
3409-1 F4
3409-2 F4
3409-3 F4
3409-4 F4
3410-1 E4
3410-2 E4
3410-3 E4
3410-4 E4
3411-1 E4
3411-2 E4
3411-3 E4
3411-4 D4
3412-1 D4
3412-2 D4
3412-3 D4
3412-4 D4
3413-1 D4
3413-2 D4
3413-3 D4
3413-4 D4
3414 A6
3415 B6
3430 B3
3431 B3
3432 C7
3436 B6
3439 B7
3440 B7
3441 B3
3442 B3
3443 A7
3444 A7
4409 C7
4440 B7
7401-4 C1
7401-8 A4
7402 A7
7437 C7
F409 A1
F410 B2
F411 B2
F412 B1
F413 A3
F417 A3
F455 A7
F456 B7
F457 B7
F525 D7
F526 D7
F527 D7
F528 D7
F529 D7
F530 E7
F531 D7
F532 E7
F533 E7
F534 E7
F535 D7
F536 D7
I409 B6
I410 B3
I411 B3
I412 B3
I413 C5
I414 C5
I415 C5
I416 C5
I417 C5
I418 D5
I419 D5
I420 D5
I421 D5
I422 D5
I424 D5
I425 D5
I426 D5
I427 D5
I428 D5
I429 D5
I430 D5
I431 D5
I432 E5
I433 B7
I434 E5
I435 B6
I436 E5
I437 E5
I438 E5
I439 E5
I440 E5
I441 E5
I442 E5
I443 E5
I444 E5
I445 E5
I446 F5
I447 F5
I448 F5
I449 F5
I450 F5
I451 F5
I452 F5

## TV & Scaler Board: Scaler IO

# A8 SCALER IO

| * | VGA | NON-VGA |
|---|---|---|
| 4460 | -- | Y |
| 4461 | -- | Y |
| 4462 | -- | Y |
| 4463 | -- | Y |
| 4464 | -- | Y |

F499 1V / div DC 20us / div
F501 1V / div DC 20us / div
F502 1V / div DC 5ms / div
F503 1V / div DC 5ms / div

**I57 ITV INTERFACE** — 1462 — BM05B-SRSS-TBT
SC1_CVBS_RF_OUT A10/ A2
H_CS_SDTV A3
V_SDTV A3

R_SDTV F471 — 3507 220R — I512 — 2477 1u0 — 3502 220R
G_SDTV F472 — 3503 220R — I513 — 2478 1u0 — 3504 220R
B_SDTV F473 — 3505 220R — I514 — 2479 1u0 — 3506 220R

1461 D-SUB
F474 RED_PR
F475 GREEN_Y
F476 BLUE_PB
F477 VGA_5V
F479 HS
F481 VS
F480 I515
F482 DDC_VGA_5V
F483

2480 1u0 I480 — 3477 22R — I483
2481 1u0 I481 — 3476 22R — I484
2482 1u0 I482 — 3475 22R — I485
S460 3474 75R
S461 3473 75R
S462 3472 75R

3481 1K0 I466
3482 1K0 I467
S463 S464

7462 M24C02-WMN6 — Φ (256x8) EEPROM — WC SCL SDA — ADR
3483 10K 3484 10K 2460 100n
3464 100R I486
3463 100R I487
22p 2K2 2461 3467
22p 2K2 2462 3468

**SD/HD SELECTION**
* 4460
* 4461
* 4462

7461 SM5301BS-G — 5V4 — VCC Φ VCC
DISABLE THROUGH MUXSEL GSR1 RINA|YINA RINB|YINB GSG1 GINA|UINA GINB|UINB GSB1 BINA|VINA BINB|VINB RFC VFC
NC1 NC2 NC3 ROUT|YOUT GOUT|UOUT BOUT|VOUT
I462 I463 I464 I465 33p 820R 2451 3471
GND GND_HS

+5VSW — 5462 — F489
VGA_5V — 3469 150R — S465 — 3470 10K — F488 — 6460 KDR721S — +5VSW — DDC_VGA_5V
F487 PC_HD_SEL A7
PC_DET A7
2471 47u 6.3V — 2472 100n — 2473 100n — 2474 100n — 2475 100n

I470 3496 22R — I473 — 2464 10n F490 SOG A6
I471 3497 22R — I474 — 2465 10n F491 R_PR+ A6
3498 22R — I475 — 2466 10n F492 R_PR- A6
I472 3499 22R — I476 — 2467 10n F493 G_Y+ A6
3480 22R — I477 — 2468 10n F494 G_Y- A6
3479 22R — I478 — 2469 10n F495 B_PB+ A6
2470 10n F496 B_PB- A6

I516 — 3478 100K — 2483 100n
F497 HD_FILTER A7
F498 SD_PCHD_SEL A7

RES 4510
+3V3STBY — 2510 100n
7510-1 74LVC14APW — I519 — 0V2
7510-2 74LVC14APW — I510 — 0V2 — 3512 220R — F499 — CS_HSYNC A6
7510-3 74LVC14APW — I520 — 0V — 3V3
7510-4 74LVC14APW — I511 — 3513 220R — F503 — VSYNC A6
7510-5 74LVC14APW
7510-6 74LVC14APW
RES 4511
4X INVERTER SCHMITT-TRIGGER
4519 RES 4518

H_CS_SDTV F501
V_SDTV F502
PLL_SEL F521
A6,A7 FBIN — F520 — 3519 0R — RES 2514

7520 MK1575-01
FBIN NC FCLK OE CLK2 FS2 CLK1 CHPR
REFIN FS0 VDDA VDDD FS1 GNDA GNDD CHGP
I492 — 4520 — 2518 10n — 2517 10n
I496 — 3520 33K — 2516 680p
I493 — 2515 10n
I494 — 2513 10u 16V — 2519 1n0 — 5520 — 2520 100n
VDD — +3V3STBY

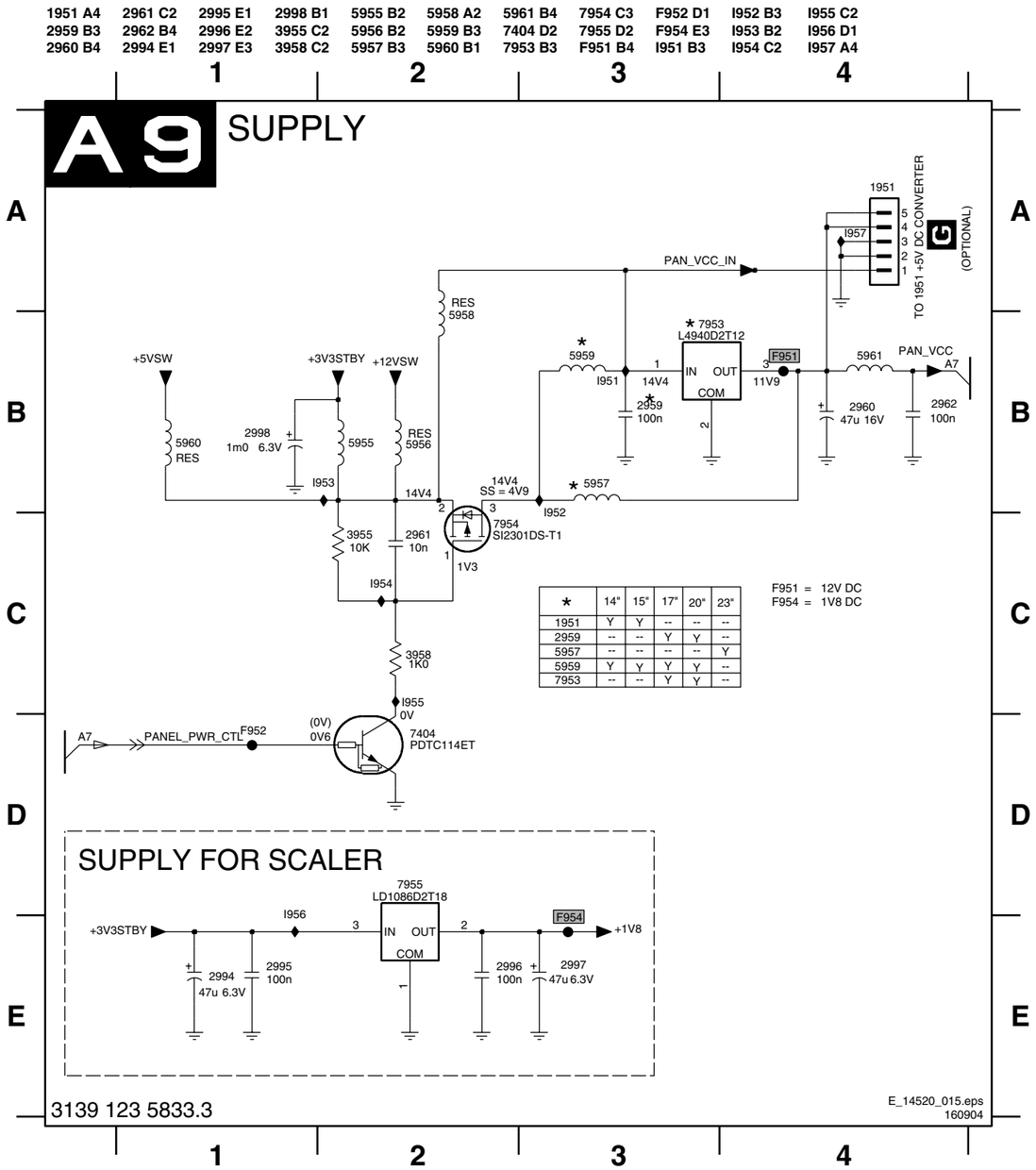
SYNC SELECTION — 7463 74HC4053D — VDD MDX VEE VSS — G4 4X1 4X2 — 3501 10K
+3V3STBY — 2463 100n — 220R — 100p — 2511 — 3510
I517 — 0V2
I518 — 0V
3511 220R — 2512 100p
* 4463
* 4464

3139 123 5833.3
E_14520_014.eps 160904

| | | |
|---|---|---|
| 1461 B1 | 4462 B5 | I493 F3 |
| 1462 A8 | 4463 F6 | I494 F3 |
| 2451 D5 | 4464 F6 | I496 F3 |
| 2460 C2 | 4510 D7 | I510 E8 |
| 2461 D4 | 4511 F7 | I511 E8 |
| 2462 D4 | 4518 F8 | I512 A3 |
| 2463 E6 | 4519 F7 | I513 A3 |
| 2464 C8 | 4520 F3 | I514 B3 |
| 2465 C8 | 5462 B6 | I515 C1 |
| 2466 C8 | 5520 F4 | I516 D6 |
| 2467 C8 | 6460 B8 | I517 E6 |
| 2468 C8 | 7461 B5 | I518 E6 |
| 2469 D8 | 7462 D3 | I519 E7 |
| 2470 D8 | 7463 E5 | I520 E7 |
| 2471 B6 | 7510-1 D7 | S460 C2 |
| 2472 B6 | 7510-2 D8 | S461 C2 |
| 2473 B7 | 7510-3 E7 | S462 C3 |
| 2474 B7 | 7510-4 E8 | S463 C2 |
| 2475 B7 | 7510-5 F7 | S464 C2 |
| 2477 A3 | 7510-6 F8 | S465 B7 |
| 2478 A3 | 7520 F2 | |
| 2479 B3 | F471 A1 | |
| 2480 B3 | F472 A1 | |
| 2481 B3 | F473 B1 | |
| 2482 B3 | F474 B1 | |
| 2483 D6 | F475 B1 | |
| 2510 D8 | F476 B1 | |
| 2511 E7 | F477 C1 | |
| 2512 E6 | F479 C1 | |
| 2513 F3 | F480 C1 | |
| 2514 F2 | F481 C1 | |
| 2515 F3 | F482 C2 | |
| 2516 F3 | F483 C3 | |
| 2517 F4 | F487 A7 | |
| 2518 F4 | F488 A7 | |
| 2519 F4 | F489 B6 | |
| 2520 F4 | F490 C8 | |
| 3463 D2 | F491 C8 | |
| 3464 D2 | F492 C8 | |
| 3467 D4 | F493 C8 | |
| 3468 D4 | F494 C8 | |
| 3469 B7 | F495 C8 | |
| 3470 B7 | F496 D8 | |
| 3471 D5 | F497 D8 | |
| 3472 C3 | F498 D8 | |
| 3473 C2 | F499 E9 | |
| 3474 C2 | F501 E1 | |
| 3475 B3 | F502 E1 | |
| 3476 B3 | F503 E9 | |
| 3477 B3 | F520 E1 | |
| 3478 D7 | F521 E1 | |
| 3479 D7 | I462 C5 | |
| 3480 D7 | I463 D5 | |
| 3481 C2 | I464 D5 | |
| 3482 C2 | I465 D5 | |
| 3483 C2 | I466 C3 | |
| 3484 C2 | I467 C3 | |
| 3496 C7 | I470 C6 | |
| 3497 C7 | I471 C6 | |
| 3498 C7 | I472 D6 | |
| 3499 C7 | I473 C8 | |
| 3501 F5 | I474 C8 | |
| 3502 A3 | I475 C8 | |
| 3503 A2 | I476 C8 | |
| 3504 A3 | I477 C8 | |
| 3505 B2 | I478 C8 | |
| 3506 B3 | I479 D8 | |
| 3507 A2 | I480 B3 | |
| 3510 E6 | I481 B3 | |
| 3511 E6 | I482 B3 | |
| 3512 E9 | I483 B4 | |
| 3513 E9 | I484 B4 | |
| 3519 E2 | I485 B4 | |
| 3520 F3 | I486 D2 | |
| 4460 B5 | I487 D2 | |
| 4461 B5 | I492 E4 | |

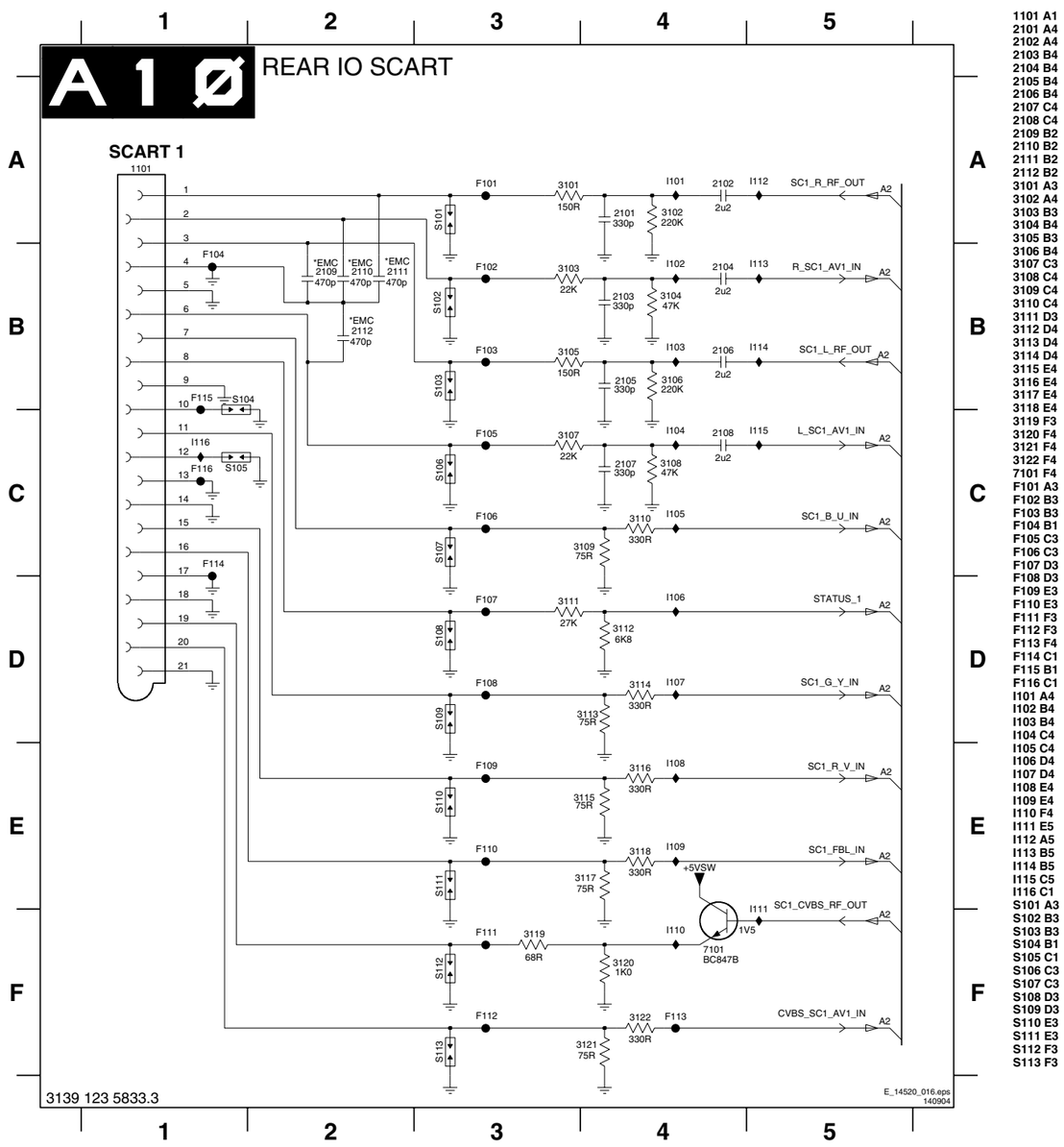
## TV & Scaler Board: Supply

1951 A4 2959 B3 2960 B4 2961 C2 2962 B4 2994 E1 2995 E1 2996 E2 2997 E3 2998 B1 3955 C2 3958 C2 5955 B2 5956 B2 5957 B3 5958 A2 5959 B3 5960 B1 7404 D2 7953 B3 7954 C3 7955 D2 F951 B4 F952 D1 F954 E3 I951 B3 I952 B3 I953 B2 I954 C2 I955 C2 I956 D1 I957 A4



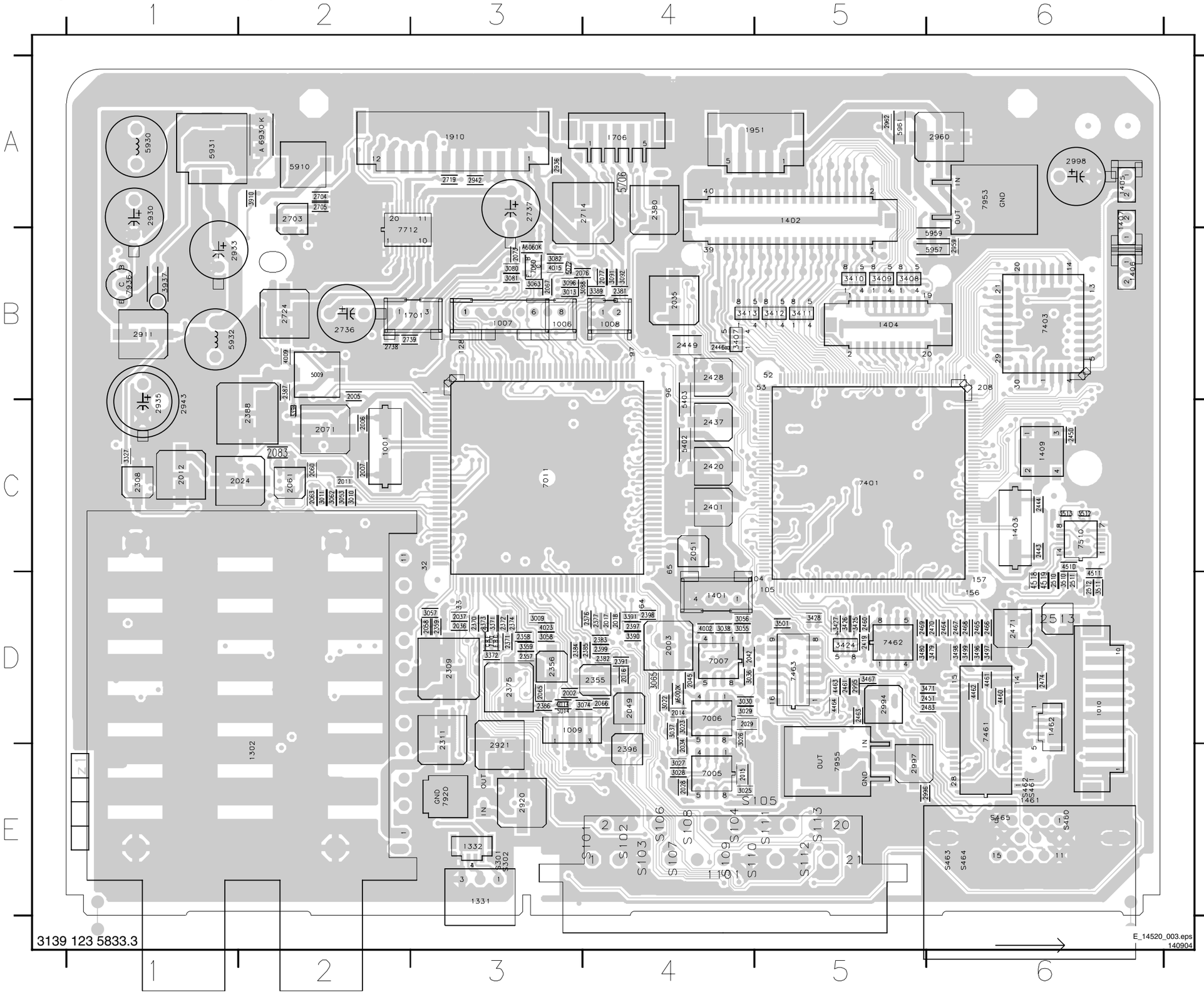

| * | 14" | 15" | 17" | 20" | 23" |
|---|---|---|---|---|---|
| 1951 | Y | Y | -- | -- | -- |
| 2959 | -- | -- | Y | Y | -- |
| 5957 | -- | -- | -- | -- | Y |
| 5959 | Y | Y | Y | Y | -- |
| 7953 | -- | -- | Y | Y | -- |

## TV & Scaler Board: Rear IO Scart



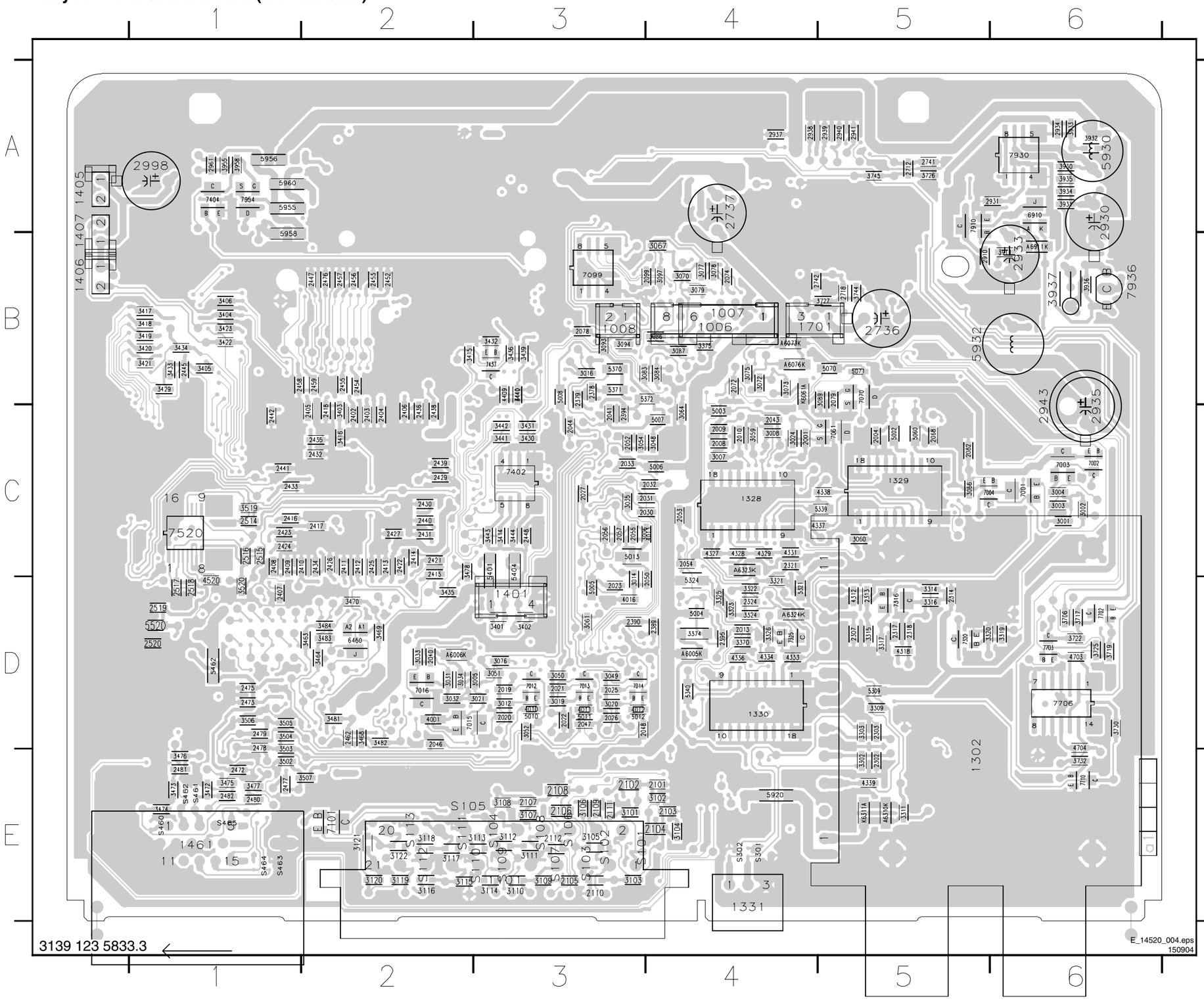

I101 A1 I102 B4 I103 B4 I104 C4 I105 C4 I106 D4 I107 D4 I108 E4 I109 E4 I110 F4 I111 E5 I112 A5 I113 B5 I114 B5 I115 C5 I116 C1 S101 A3 S102 B3 S103 B3 S104 B1 S105 C1 S106 C3 S107 C3 S108 D3 S109 D3 S110 E3 S111 E3 S112 F3 S113 F3

## Layout TV & Scaler Board (Top Side)



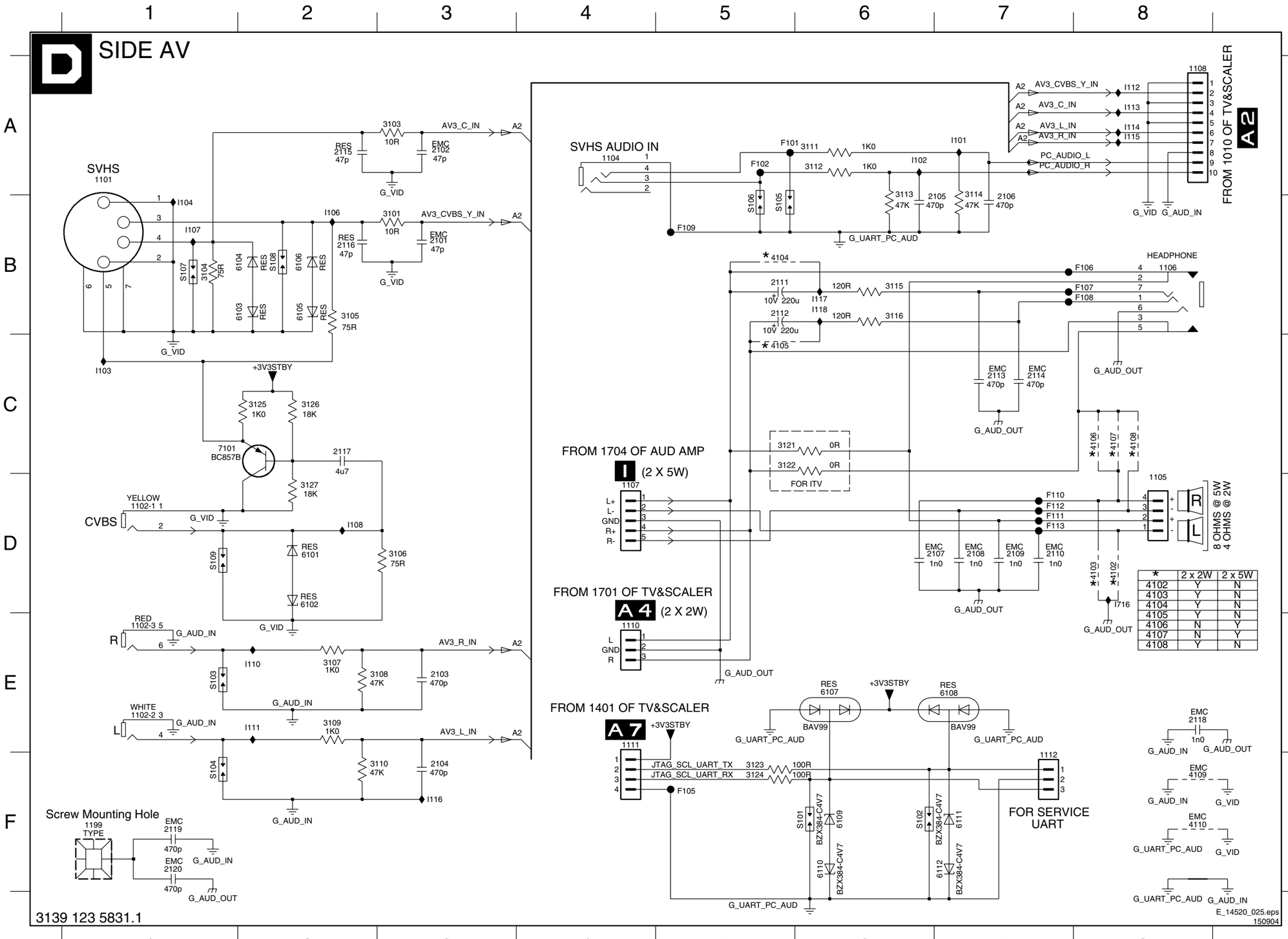

| | | | | | |
|---|---|---|---|---|---|
| 1006 | B3 | 2419 | D5 | 3389 | B4 |
| 1007 | B3 | 2420 | C4 | 3390 | D4 |
| 1008 | B4 | 2428 | B4 | 3391 | D4 |
| 1009 | D3 | 2437 | C4 | 3394 | C2 |
| 1010 | D6 | 2443 | C6 | 3407 | B4 |
| 1101 | E4 | 2444 | C6 | 3408 | B5 |
| 1302 | E2 | 2446 | B4 | 3409 | B5 |
| 1331 | E3 | 2449 | B4 | 3410 | B5 |
| 1332 | E3 | 2450 | C6 | 3411 | B5 |
| 1401 | D4 | 2451 | D6 | 3412 | B5 |
| 1402 | A5 | 2460 | D5 | 3413 | B4 |
| 1403 | C6 | 2461 | D5 | 3424 | D5 |
| 1404 | B5 | 2463 | D5 | 3425 | D5 |
| 1405 | A6 | 2464 | D6 | 3426 | D5 |
| 1406 | B6 | 2465 | D6 | 3427 | D5 |
| 1407 | A6 | 2466 | D6 | 3428 | D5 |
| 1409 | C6 | 2467 | D6 | 3467 | D5 |
| 1461 | E6 | 2468 | D6 | 3471 | D6 |
| 1462 | D6 | 2469 | D5 | 3479 | D6 |
| 1701 | B3 | 2470 | D6 | 3480 | D5 |
| 1706 | A4 | 2471 | D6 | 3496 | D6 |
| 1910 | A3 | 2474 | D6 | 3497 | D6 |
| 1951 | A5 | 2483 | D6 | 3498 | D6 |
| 2002 | D3 | 2510 | D6 | 3499 | D6 |
| 2003 | D4 | 2511 | D6 | 3501 | D5 |
| 2005 | B2 | 2512 | D6 | 3510 | D6 |
| 2006 | C2 | 2513 | D6 | 3511 | D6 |
| 2007 | C2 | 2703 | A2 | 3512 | C6 |
| 2011 | C2 | 2704 | A2 | 3513 | C6 |
| 2012 | C1 | 2705 | A2 | 3910 | A2 |
| 2014 | D4 | 2714 | A4 | 3937 | B1 |
| 2015 | E4 | 2719 | A3 | 4002 | D4 |
| 2016 | D4 | 2724 | B2 | 4009 | B2 |
| 2017 | D4 | 2736 | B2 | 4014 | D3 |
| 2018 | D4 | 2737 | A3 | 4015 | B3 |
| 2024 | C2 | 2738 | B2 | 4023 | D3 |
| 2028 | E4 | 2739 | B2 | 4460 | D6 |
| 2029 | D4 | 2911 | B1 | 4461 | D6 |
| 2034 | E4 | 2920 | E3 | 4462 | D6 |
| 2035 | B4 | 2921 | E3 | 4463 | D5 |
| 2036 | D3 | 2930 | A1 | 4464 | D5 |
| 2037 | D3 | 2933 | B1 | 4510 | C6 |
| 2042 | D4 | 2935 | C1 | 4511 | D6 |
| 2045 | D4 | 2936 | A3 | 4518 | D6 |
| 2049 | D4 | 2942 | A3 | 4519 | D6 |
| 2051 | C4 | 2943 | C1 | 5009 | B2 |
| 2058 | D3 | 2959 | B6 | 5014 | D3 |
| 2060 | C2 | 2960 | A6 | 5072 | B3 |
| 2061 | C2 | 2962 | A5 | 5402 | C4 |
| 2063 | C2 | 2994 | D5 | 5403 | C4 |
| 2065 | D3 | 2995 | D5 | 5706 | A4 |
| 2066 | D4 | 2996 | E5 | 5910 | A2 |
| 2067 | B3 | 2997 | E5 | 5930 | A1 |
| 2071 | C2 | 2998 | A6 | 5931 | A1 |
| 2073 | B3 | 3009 | D3 | 5932 | B1 |
| 2076 | B3 | 3010 | C2 | 5957 | B6 |
| 2077 | B4 | 3011 | C2 | 5959 | B6 |
| 2083 | C2 | 3013 | B3 | 5961 | A5 |
| 2308 | C1 | 3022 | D4 | 6002 | D4 |
| 2309 | D3 | 3023 | D4 | 6060 | B3 |
| 2311 | D3 | 3025 | E4 | 6930 | A2 |
| 2355 | D4 | 3026 | D4 | 7005 | E4 |
| 2356 | D3 | 3027 | E4 | 7006 | D4 |
| 2357 | D3 | 3028 | E4 | 7007 | D4 |
| 2358 | D3 | 3029 | D4 | 7011 | C3 |
| 2359 | D3 | 3030 | D4 | 7060 | B3 |
| 2370 | D3 | 3036 | D4 | 7370 | D3 |
| 2371 | D3 | 3037 | D4 | 7401 | C5 |
| 2372 | D3 | 3038 | D4 | 7403 | B6 |
| 2373 | D3 | 3053 | C2 | 7461 | D6 |
| 2374 | D3 | 3055 | D4 | 7462 | D5 |
| 2375 | D3 | 3056 | D4 | 7463 | D5 |
| 2376 | D4 | 3057 | D3 | 7510 | C6 |
| 2377 | D4 | 3058 | D3 | 7712 | B2 |
| 2380 | A4 | 3062 | C2 | 7920 | E3 |
| 2381 | B4 | 3063 | B3 | 7936 | B1 |
| 2382 | D4 | 3065 | D4 | 7953 | A6 |
| 2383 | D4 | 3074 | D4 | 7955 | E5 |
| 2384 | D3 | 3080 | B3 | | |
| 2385 | D4 | 3081 | B3 | | |
| 2386 | D3 | 3082 | B3 | | |
| 2387 | B2 | 3088 | B4 | | |
| 2388 | C2 | 3091 | B4 | | |
| 2391 | D4 | 3092 | B4 | | |
| 2396 | E4 | 3096 | B3 | | |
| 2397 | D4 | 3327 | C1 | | |
| 2398 | D4 | 3359 | D3 | | |
| 2399 | D4 | 3371 | D3 | | |
| 2401 | C4 | 3372 | D3 | | |

## Layout TV & Scaler Board (Bottom Side)




| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1328 | C4 | 2425 | C2 | 3070 | B4 | 3469 | D2 | 5520 | D1 | 2105 | E3 | 2718 | B5 | 3319 | D6 | 4013 | C4 | S102 | E3 |
| 1329 | C5 | 2426 | C2 | 3072 | B4 | 3470 | D2 | 5920 | E4 | 2106 | E3 | 2741 | A5 | 3320 | D5 | 4016 | D3 | S103 | E3 |
| 1330 | D4 | 2427 | C2 | 3073 | B4 | 3472 | E1 | 5955 | A1 | 2107 | E3 | 2742 | B4 | 3321 | D4 | 4312 | D5 | S104 | E3 |
| 2001 | C4 | 2429 | C2 | 3075 | B4 | 3473 | E1 | 5956 | A1 | 2108 | E3 | 2910 | B5 | 3322 | D4 | 4318 | D5 | S105 | E2 |
| 2004 | C5 | 2430 | C2 | 3076 | D3 | 3474 | E1 | 5958 | B1 | 2109 | E3 | 2931 | A6 | 3323 | D4 | 4327 | C4 | S106 | E3 |
| 2008 | C4 | 2431 | C2 | 3077 | B4 | 3475 | E1 | 5960 | A1 | 2110 | E3 | 2934 | A6 | 3324 | D4 | 4328 | C4 | S107 | E3 |
| 2009 | C4 | 2432 | C2 | 3078 | B4 | 3476 | E1 | 6005 | D4 | 2111 | E3 | 2937 | A4 | 3325 | D4 | 4329 | C4 | S108 | E3 |
| 2010 | C4 | 2433 | C1 | 3079 | B4 | 3477 | E1 | 6006 | D2 | 2112 | E3 | 2938 | A4 | 3326 | D4 | 4331 | C4 | S109 | E3 |
| 2013 | D4 | 2434 | C2 | 3083 | B3 | 3478 | C2 | 6061 | B4 | 2302 | E5 | 2939 | A5 | 3370 | D4 | 4333 | D4 | S110 | E3 |
| 2019 | D3 | 2435 | C2 | 3084 | B4 | 3481 | D2 | 6073 | B4 | 2303 | D5 | 2940 | A5 | 3374 | D4 | 4334 | D4 | S111 | E2 |
| 2020 | D3 | 2436 | C2 | 3086 | B4 | 3482 | D2 | 6076 | B4 | 2307 | D5 | 2941 | A5 | 3375 | B4 | 4336 | D4 | S112 | E2 |
| 2021 | D3 | 2438 | C2 | 3087 | B4 | 3483 | D2 | 6310 | E5 | 2313 | D5 | 2961 | A1 | 3401 | D3 | 4337 | C5 | S113 | E2 |
| 2022 | D3 | 2439 | C2 | 3089 | B5 | 3484 | D2 | 6311 | E5 | 2314 | D5 | 3001 | C6 | 3402 | D3 | 4338 | C5 | S301 | E4 |
| 2023 | D3 | 2440 | C2 | 3093 | B3 | 3502 | E1 | 6323 | C4 | 2317 | D5 | 3002 | C6 | 3403 | C2 | 4339 | E5 | S302 | E4 |
| 2025 | D3 | 2441 | C1 | 3094 | B3 | 3503 | E1 | 6324 | D4 | 2318 | D5 | 3003 | C6 | 3404 | B1 | 4409 | B3 | S460 | E1 |
| 2026 | D3 | 2442 | C1 | 3097 | B4 | 3504 | D1 | 6460 | D2 | 2321 | C4 | 3004 | C6 | 3405 | B1 | 4440 | B3 | S461 | E1 |
| 2027 | C3 | 2445 | B1 | 3101 | E3 | 3505 | D1 | 6910 | A6 | 2324 | D4 | 3005 | D3 | 3406 | B1 | 4520 | D1 | S462 | E1 |
| 2030 | C4 | 2447 | B2 | 3102 | E4 | 3506 | D1 | 6911 | B6 | 2378 | B3 | 3006 | C3 | 3414 | C3 | 4703 | D6 | S463 | E1 |
| 2031 | C4 | 2448 | C3 | 3103 | E3 | 3507 | E2 | 7001 | C6 | 2379 | B3 | 3007 | C4 | 3415 | B2 | 4704 | D6 | S464 | E1 |
| 2032 | C4 | 2452 | B2 | 3104 | E4 | 3519 | C1 | 7002 | C6 | 2389 | D4 | 3008 | C4 | 3416 | C2 | 5002 | C5 | S465 | E1 |
| 2033 | C3 | 2453 | B2 | 3105 | E3 | 3520 | D1 | 7003 | C6 | 2390 | D3 | 3012 | D3 | 3417 | B1 | 5003 | C4 | | |
| 2040 | D2 | 2454 | B2 | 3106 | E3 | 3706 | D6 | 7004 | C5 | 2394 | C3 | 3014 | D3 | 3418 | B1 | 5004 | D4 | | |
| 2041 | C3 | 2455 | B2 | 3107 | E3 | 3717 | D6 | 7012 | D3 | 2395 | D4 | 3016 | B3 | 3419 | B1 | 5005 | D3 | | |
| 2043 | C4 | 2456 | B2 | 3108 | E3 | 3719 | D6 | 7013 | D3 | 2402 | C2 | 3019 | D3 | 3420 | B1 | 5006 | C4 | | |
| 2044 | C3 | 2457 | B2 | 3109 | E3 | 3722 | D6 | 7014 | D3 | 2403 | C2 | 3020 | D3 | 3421 | B1 | 5007 | C4 | | |
| 2046 | D2 | 2458 | B1 | 3110 | E3 | 3725 | D6 | 7015 | D2 | 2404 | C2 | 3021 | D3 | 3422 | B1 | 5008 | B3 | | |
| 2047 | D3 | 2459 | B2 | 3111 | E3 | 3726 | A5 | 7016 | D2 | 2405 | C2 | 3024 | C4 | 3423 | B1 | 5010 | D3 | | |
| 2048 | D3 | 2462 | D2 | 3112 | E3 | 3727 | B5 | 7061 | C5 | 2406 | C2 | 3031 | D2 | 3429 | B1 | 5011 | D3 | | |
| 2050 | D4 | 2472 | E1 | 3113 | E3 | 3730 | D6 | 7070 | B5 | 2407 | D1 | 3032 | D2 | 3430 | C3 | 5012 | D3 | | |
| 2052 | C3 | 2473 | D1 | 3114 | E3 | 3732 | E6 | 7099 | B3 | 2408 | C1 | 3033 | D2 | 3431 | C3 | 5013 | C3 | | |
| 2053 | C4 | 2475 | D1 | 3115 | E2 | 3744 | B5 | 7101 | E2 | 2409 | C1 | 3034 | D2 | 3432 | B3 | 5060 | C5 | | |
| 2054 | C4 | 2476 | B2 | 3116 | E2 | 3745 | A5 | 7316 | D5 | 2410 | C2 | 3035 | C3 | 3433 | B1 | 5070 | B5 | | |
| 2055 | C3 | 2477 | E1 | 3117 | E2 | 3911 | B6 | 7320 | D5 | 2411 | C2 | 3048 | C4 | 3434 | B1 | 5071 | B5 | | |
| 2056 | C3 | 2478 | D1 | 3118 | E2 | 3930 | A6 | 7325 | D4 | 2412 | C2 | 3049 | D3 | 3435 | D2 | 5309 | D5 | | |
| 2057 | C3 | 2479 | D1 | 3119 | E2 | 3931 | A6 | 7402 | C3 | 2413 | C2 | 3050 | D3 | 3436 | B3 | 5321 | D4 | | |
| 2068 | C5 | 2480 | E1 | 3120 | E2 | 3932 | A6 | 7404 | A1 | 2414 | C2 | 3051 | D3 | 3439 | B3 | 5324 | D4 | | |
| 2072 | B4 | 2481 | E1 | 3121 | E2 | 3933 | A6 | 7437 | B3 | 2415 | C2 | 3052 | D3 | 3440 | B3 | 5339 | C5 | | |
| 2074 | B4 | 2482 | E1 | 3122 | E2 | 3934 | A6 | 7520 | C1 | 2416 | C1 | 3054 | C3 | 3441 | C3 | 5340 | D4 | | |
| 2078 | B3 | 2514 | C1 | 3302 | E5 | 3935 | A6 | 7702 | D6 | 2417 | C2 | 3059 | C4 | 3442 | C3 | 5370 | B3 | | |
| 2079 | B5 | 2515 | C1 | 3303 | D5 | 3936 | B6 | 7703 | D6 | 2418 | C2 | 3060 | C5 | 3443 | C3 | 5371 | B3 | | |
| 2082 | C5 | 2516 | C1 | 3309 | D5 | 3955 | A1 | 7706 | D6 | 2421 | C2 | 3061 | D3 | 3444 | C3 | 5372 | B4 | | |
| 2099 | B4 | 2517 | D1 | 3311 | E5 | 3958 | A1 | 7710 | E6 | 2422 | C2 | 3064 | C4 | 3463 | D2 | 5401 | C3 | | |
| 2101 | E4 | 2518 | D1 | 3314 | D5 | 4001 | D2 | 7910 | A5 | 2423 | C1 | 3066 | C5 | 3464 | D2 | 5404 | C3 | | |
| 2102 | E3 | 2519 | D1 | 3315 | D5 | 4010 | D3 | 7930 | A6 | 2424 | C1 | 3067 | B4 | 3468 | D2 | 5462 | D1 | | |
| 2103 | E4 | 2520 | D1 | 3316 | D5 | 4011 | D3 | 7954 | A1 | | | | | | | | | | |
| 2104 | E4 | 2712 | A5 | 3317 | D5 | 4012 | D3 | S101 | E3 | | | | | | | | | | |

## Side AV Panel



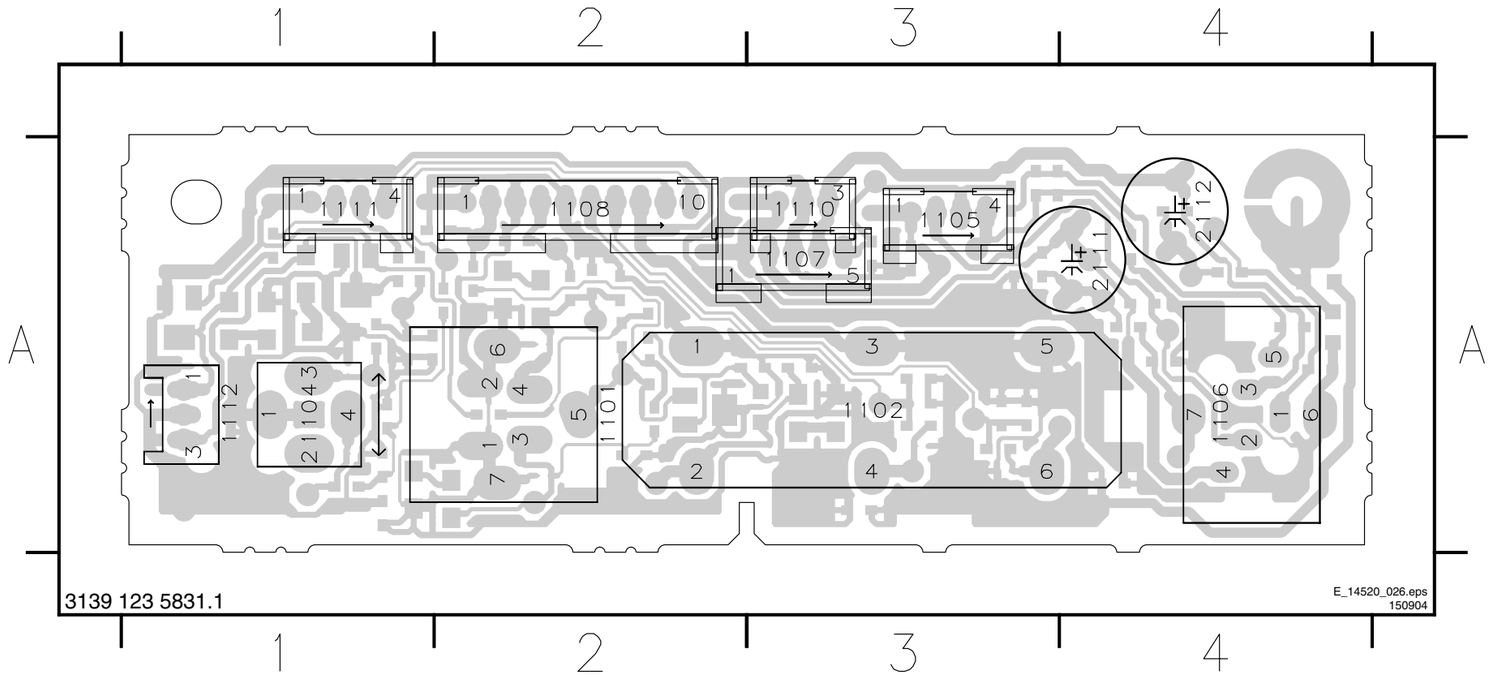

| * | 2 x 2W | 2 x 5W |
|---|---|---|
| 4102 | Y | N |
| 4103 | Y | N |
| 4104 | Y | N |
| 4105 | Y | N |
| 4106 | N | Y |
| 4107 | N | Y |
| 4108 | Y | N |

3139 123 5831.1

1101 A1
1102-1 D1
1102-2 E1
1102-3 E1
1104 A4
1105 D8
1106 B8
1107 D4
1108 A8
1110 E4
1111 E4
1112 F7
1199 F1
2101 B3
2102 A3
2103 E3
2104 F3
2105 A7
2106 A7
2107 D7
2108 D7
2109 D7
2110 D7
2111 B5
2112 B5
2113 C7
2114 C7
2115 A2
2116 B2
2117 C2
2118 E8
2119 F1
2120 F1
3101 B3
3103 A3
3104 B1
3105 B2
3106 D3
3107 E2
3108 E3
3109 E2
3110 F3
3111 A6
3112 A6
3113 A6
3114 A7
3115 B6
3116 B6
3121 C5
3122 C5
3123 F5
3124 F5
3125 C2
3126 C2
3127 D2
4102 D8
4103 D8
4104 B5
4105 C5
4106 C8
4107 C8
4108 C8
4109 F8
4110 F8
6101 D2
6102 D2
6103 B2
6104 B1
6105 B2
6106 B2
6107 E6
6108 E7
6109 F6
6110 F6
6111 F7
6112 F7
7101 C1
F101 A5
F102 A5
F105 F5
F106 B8
F107 B8
F108 B8
F109 B5
F110 D7
F111 D7
F112 D7
F113 D7
I101 A7
I102 A6
I103 C1
I104 B1
I106 B2
I107 B1
I108 D2
I110 E2
I111 E2
I112 A8
I113 A8
I114 A8
I115 A8
I116 F3
I117 B6
I118 B6
I716 D8
S101 F6
S102 F6
S103 E1
S104 F1
S105 B5
S106 B5
S107 B1
S108 B2
S109 D1

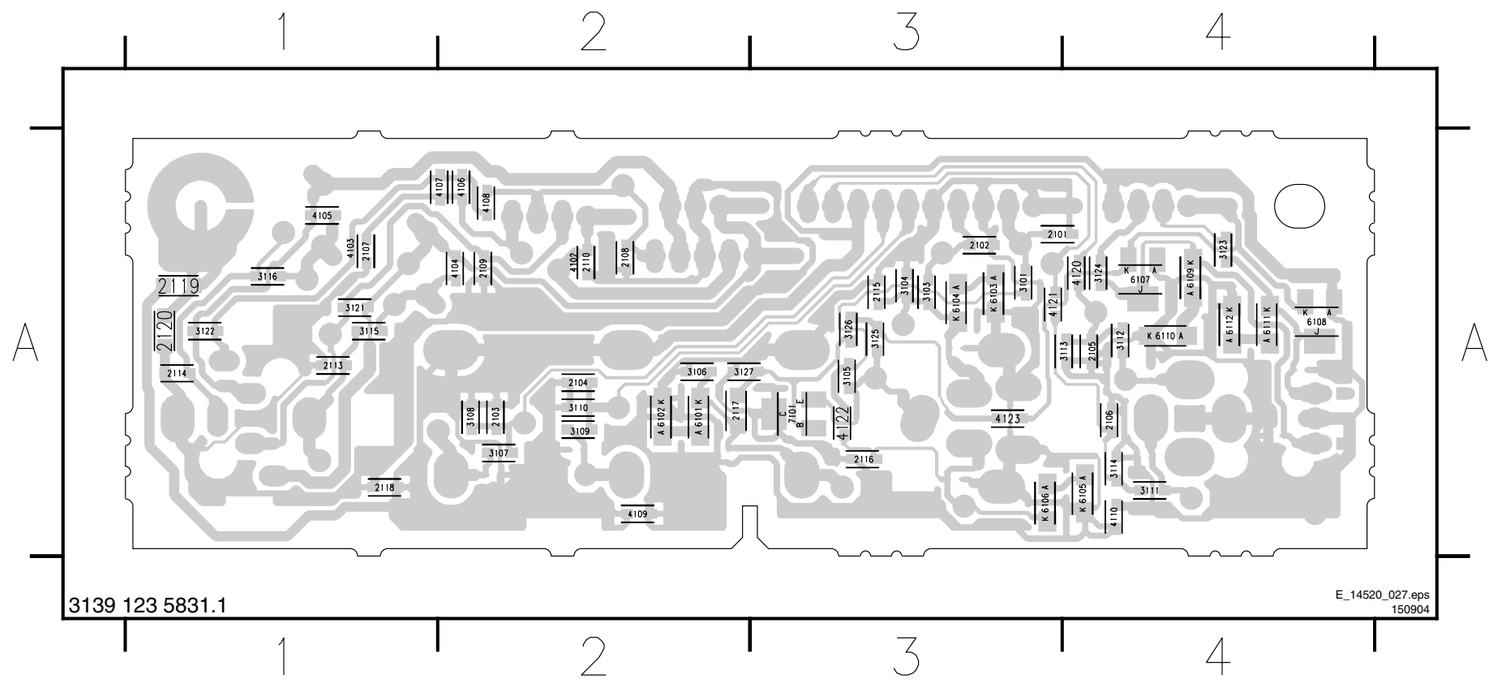
## Layout Side AV Panel (Top Side)

| | | | | | |
|---|---|---|---|---|---|
| 1101 A2 | 1104 A1 | 1106 A4 | 1108 A2 | 1111 A1 | 2111 A4 |
| 1102 A3 | 1105 A3 | 1107 A3 | 1110 A3 | 1112 A1 | 2112 A4 |

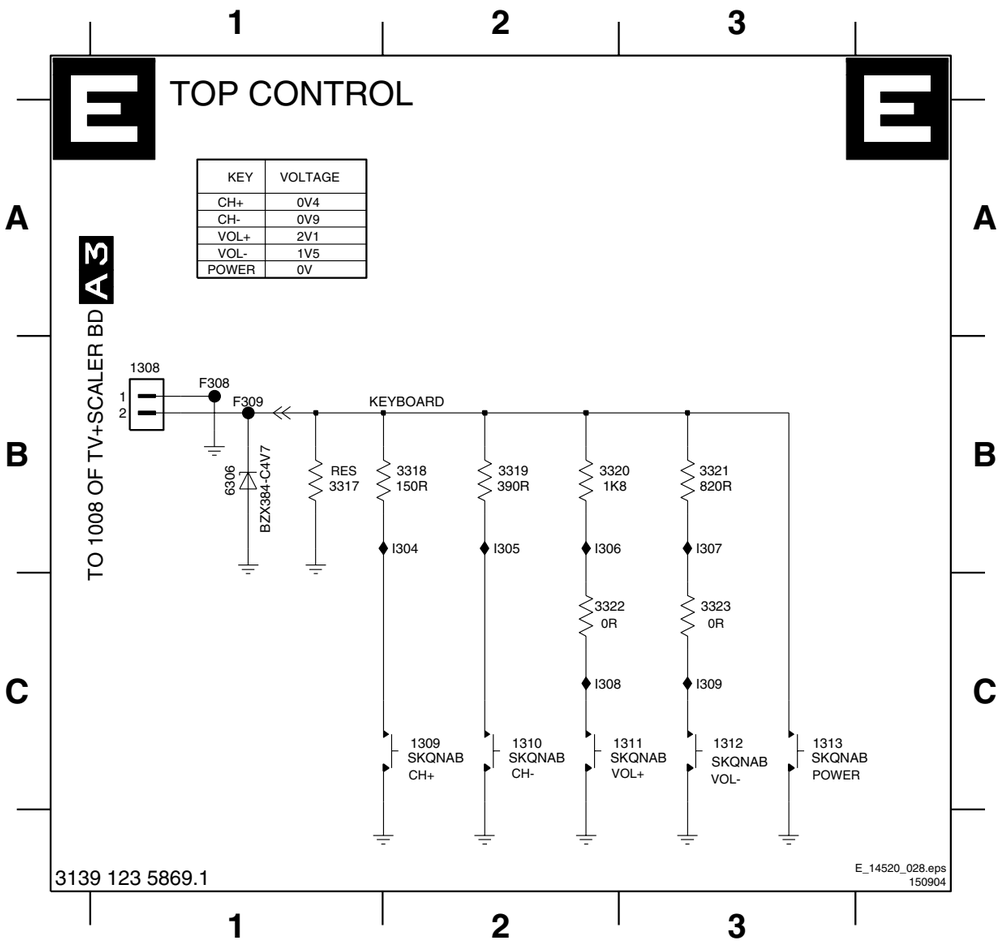



## Layout Side AV Panel (Bottom Side)

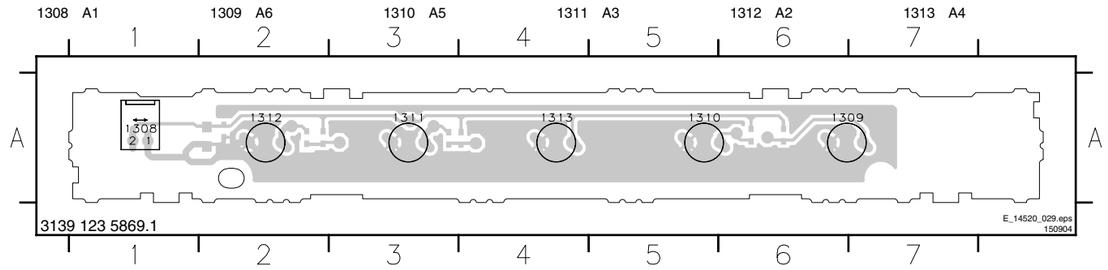
| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2101 A3 | 2106 A4 | 2113 A1 | 2118 A1 | 3104 A3 | 3109 A2 | 3114 A4 | 3123 A4 | 4102 A2 | 4107 A2 | 4121 A3 | 6103 A3 | 6108 A4 | 7101 A3 | |
| 2102 A3 | 2107 A1 | 2114 A1 | 2119 A1 | 3105 A3 | 3110 A2 | 3115 A1 | 3124 A4 | 4103 A1 | 4108 A2 | 4122 A3 | 6104 A3 | 6109 A4 | | |
| 2103 A2 | 2108 A2 | 2115 A3 | 2120 A1 | 3106 A2 | 3111 A4 | 3116 A1 | 3125 A3 | 4104 A2 | 4109 A2 | 4123 A3 | 6105 A4 | 6110 A4 | | |
| 2104 A2 | 2109 A2 | 2116 A3 | 3101 A3 | 3107 A2 | 3112 A4 | 3121 A1 | 3126 A3 | 4105 A1 | 4110 A4 | 6101 A2 | 6106 A3 | 6111 A4 | | |
| 2105 A4 | 2110 A2 | 2117 A2 | 3103 A3 | 3108 A2 | 3113 A4 | 3122 A1 | 3127 A2 | 4106 A2 | 4120 A4 | 6102 A2 | 6107 A4 | 6112 A4 | | |



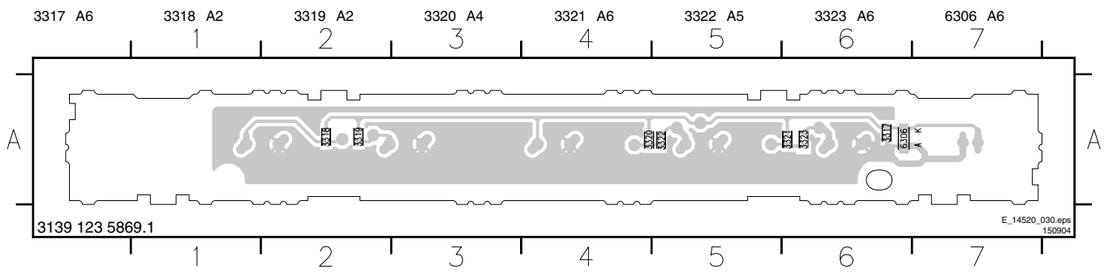
## Top Control Panel



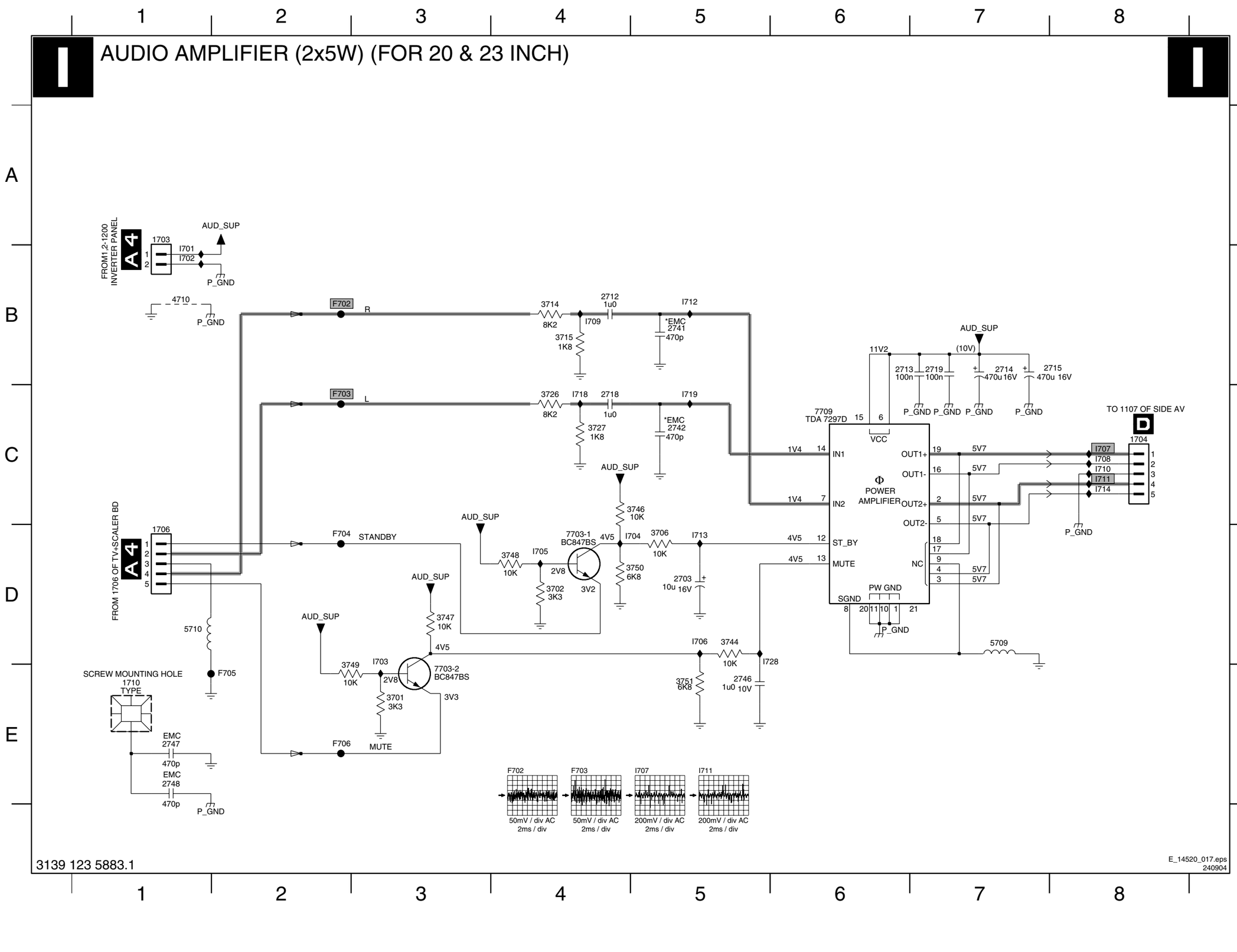

## Layout Top Control Panel (Top Side)




## Layout Top Control Panel (Bottom Side)

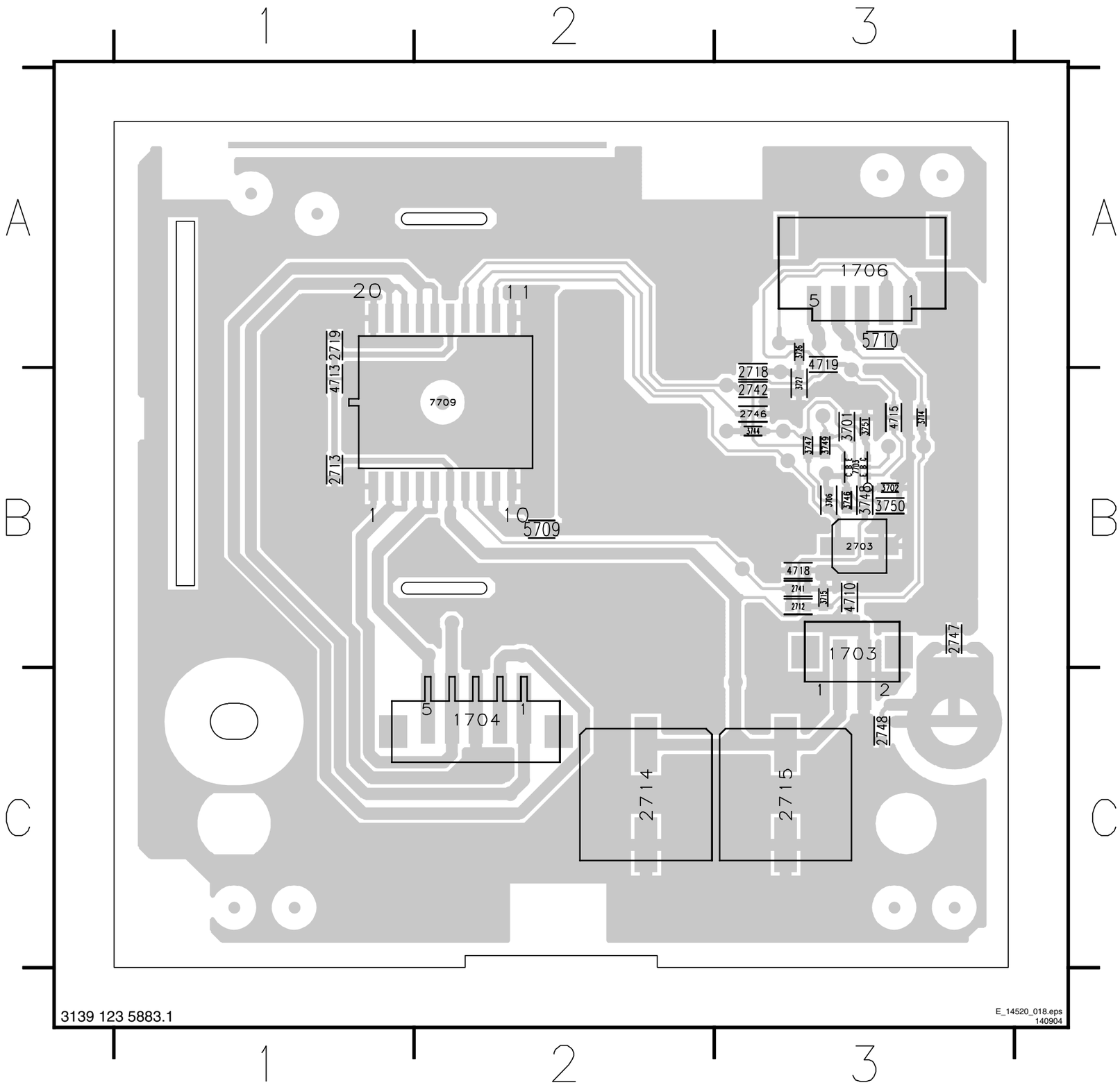


## Audio Amplifier (2x5W) (20 & 23 inch)




1703 A1
1704 C8
1706 D1
1710 E1
2703 D5
2712 B4
2713 B6
2714 B7
2715 B8
2718 C4
2719 B7
2741 B5
2742 C5
2746 E5
2747 E1
2748 E1
3701 E3
3702 D4
3706 D5
3714 B4
3715 B4
3726 C4
3727 C4
3744 D5
3746 C5
3747 D3
3748 D4
3749 E2
3750 D5
3751 E5
4710 B1
5709 D7
5710 D1
7703-1 D4
7703-2 E3
7709 C6
F702 B2
F703 C2
F704 D2
F705 E2
F706 E2
I701 B1
I702 B1
I703 D3
I704 D5
I705 D4
I706 D5
I707 C8
I708 C8
I709 B4
I710 C8
I711 C8
I712 B5
I713 D5
I714 C8
I718 C4
I719 C5
I728 D6

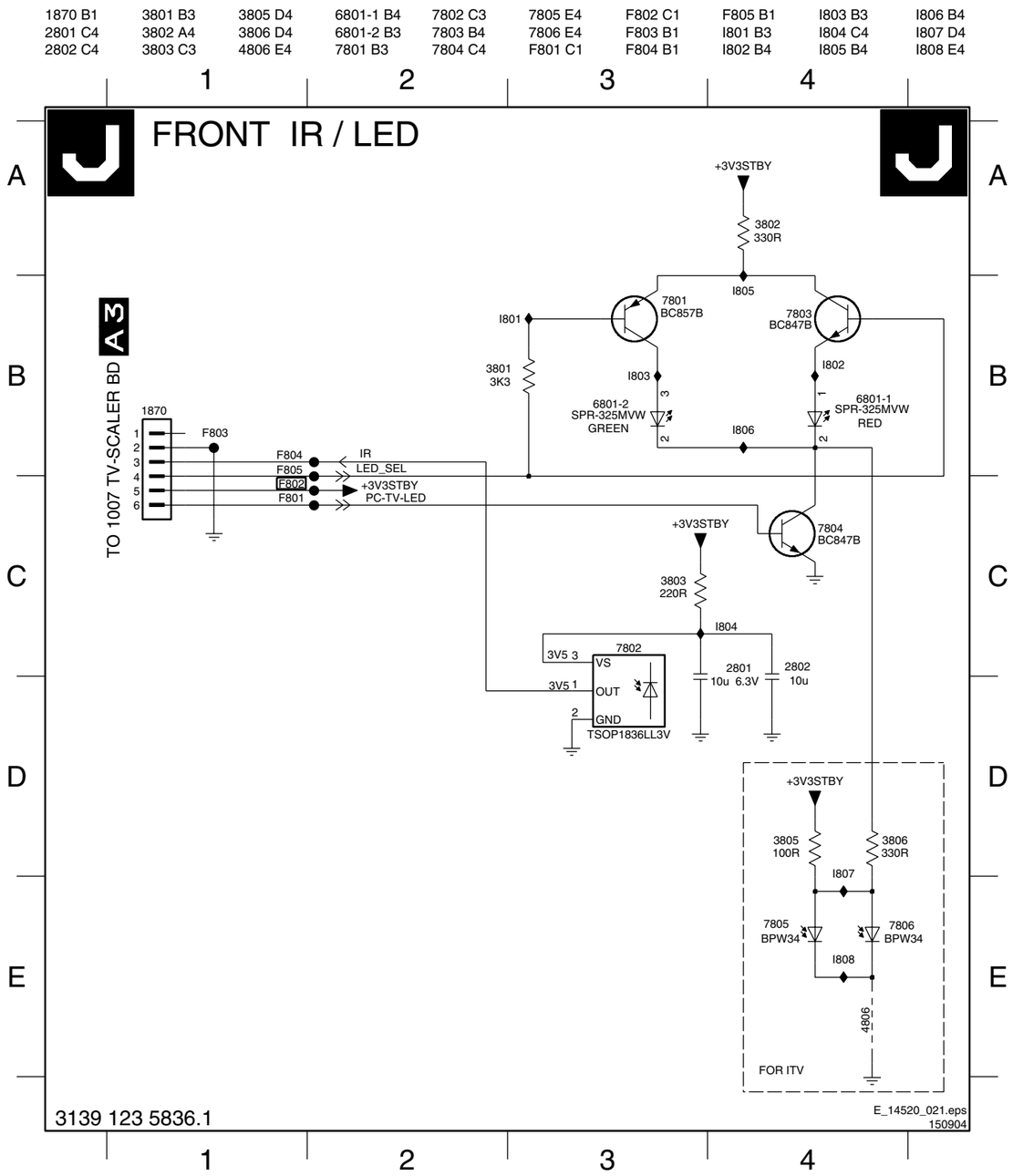
## Audio Amplifier (2x5W) (20 & 23 inch)




1703 B3
1704 C2
1706 A3
2703 B3
2712 B3
2713 B1
2714 C2
2715 C3
2718 B3
2719 A1
2741 B3
2742 B3
2746 B3
2747 B3
2748 C3
3701 B3
3702 B3
3706 B3
3714 B3
3715 B3
3726 A3
3727 B3
3744 B3
3746 B3
3747 B3
3748 B3
3749 B3
3750 B3
3751 B3
4710 B3
4713 B1
4715 B3
4718 B3
4719 A3
5709 B2
5710 A3
7703 B3
7709 B2

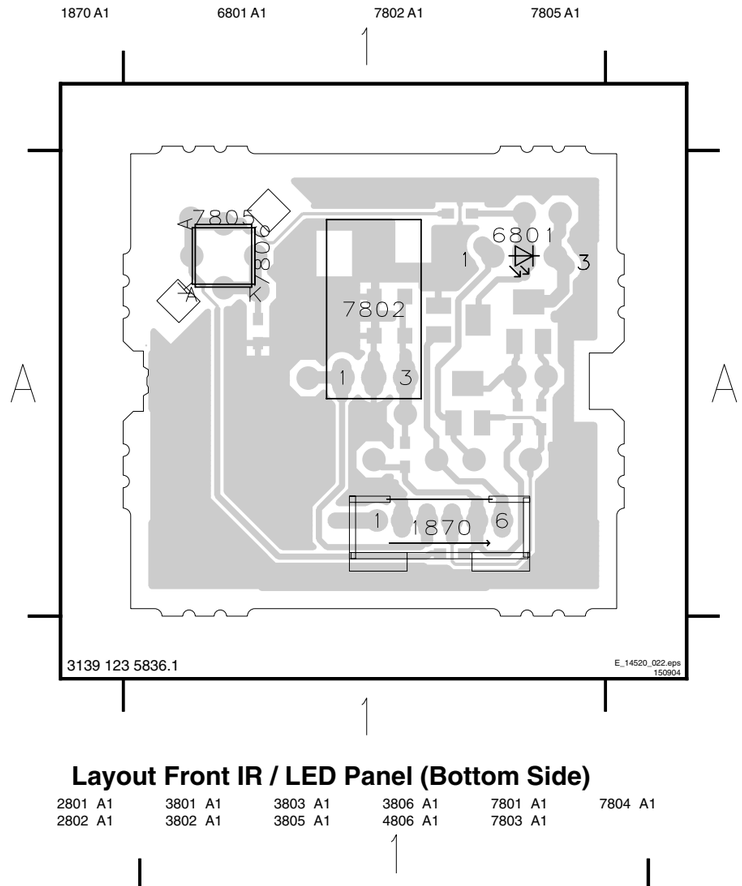
## Front IR / LED Panel

1870 B1 3801 B3 3805 D4 6801-1 B4 7802 C3 7805 E4 F802 C1 F805 B1 I803 B3 I806 B4
2801 C4 3802 A4 3806 D4 6801-2 B3 7803 B4 7806 E4 F803 B1 I801 B3 I804 C4 I807 D4
2802 C4 3803 C3 4806 E4 7801 B3 7804 C4 F801 C1 F804 B1 I802 B4 I805 B4 I808 E4



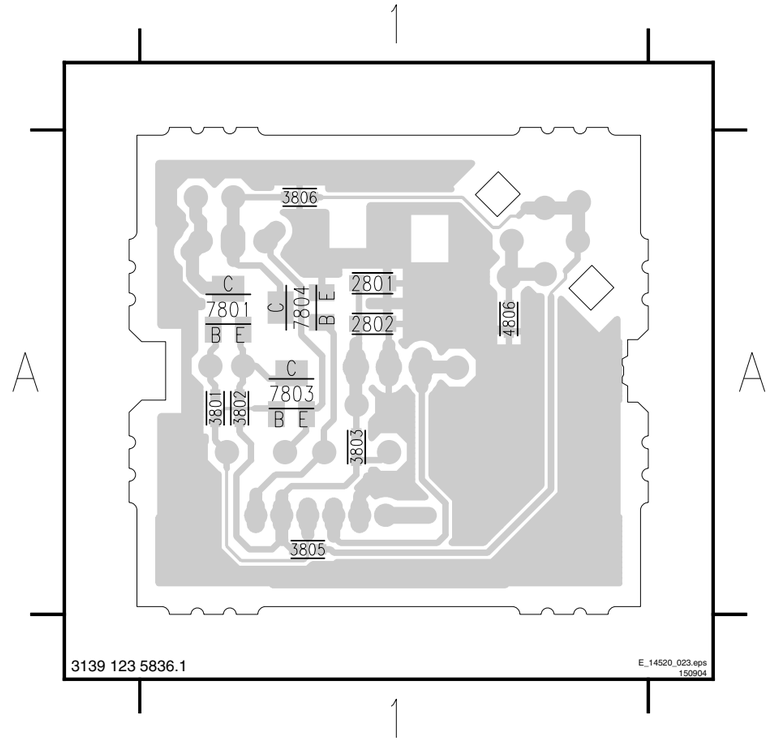

## Layout Front IR / LED Panel (Top Side)

1870 A1 6801 A1 7802 A1 7805 A1




## Layout Front IR / LED Panel (Bottom Side)

2801 A1 3801 A1 3803 A1 3806 A1 7801 A1 7804 A1
2802 A1 3802 A1 3805 A1 4806 A1 7803 A1



***Personal Notes:***

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060804

# 8. Alignments

General: The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5. Menu navigation is done with the cursor Up, Down, Left or Right keys of the remote control transmitter.

## 8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:
Mains voltage and frequency: 100-240 V / 50/60 Hz.
Allow the set to warm up for approximately 10 minutes.
Test probe: Ri > 10 M ohm; Ci < 2.5 pF.

### 8.3.1 SAM Menu

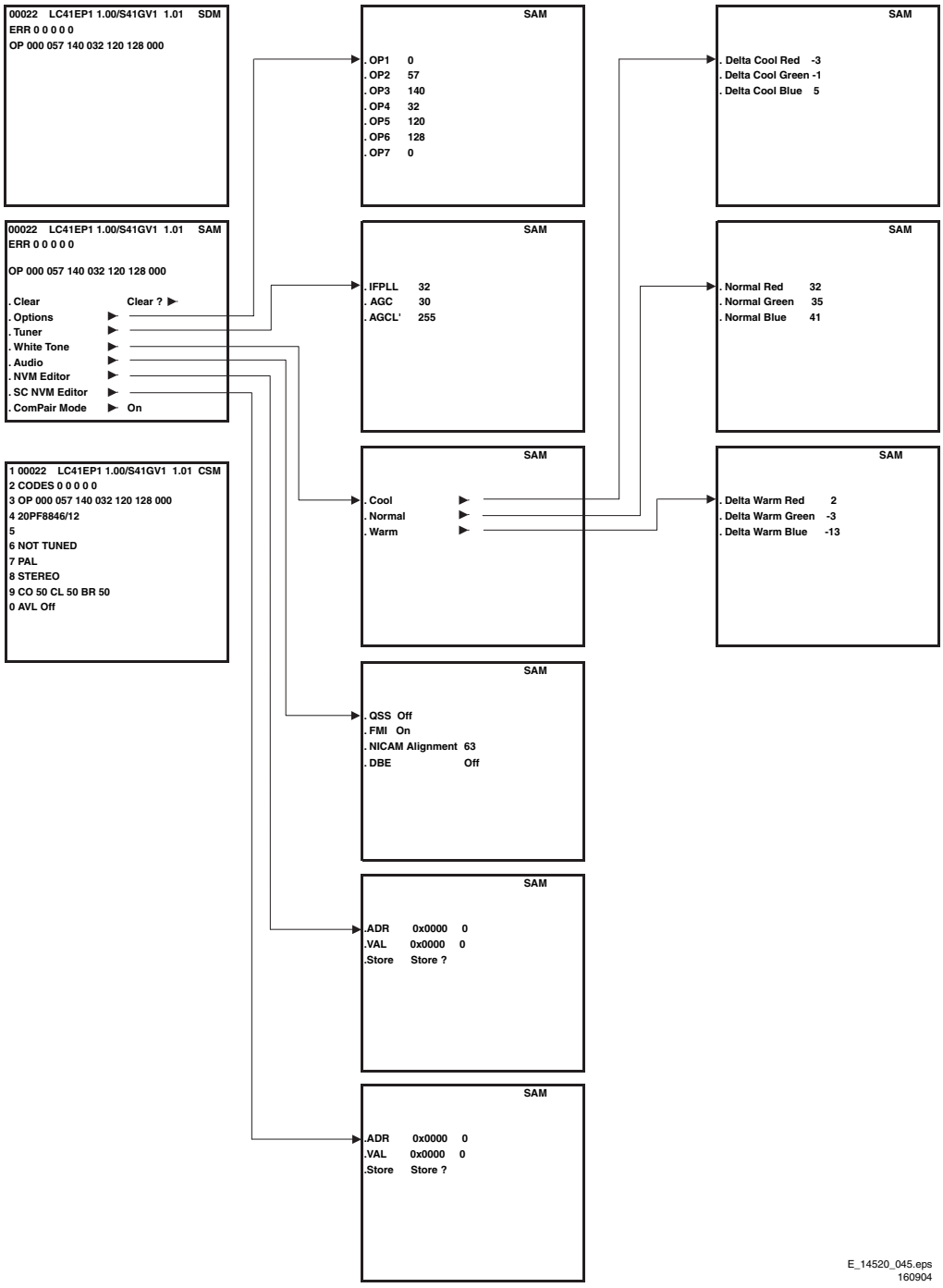



**Figure 8-1 SAM Menu**

## 8.2 Hardware Alignments

There are no hardware alignments foreseen for the LCD-TV.

## 8.3 Software Alignments

With the software alignments of the Service Alignment Mode (SAM) the geometry, white tone and tuner (IF) can be aligned. To store the data: Use the RC button Menu to switch to the main menu and next, switch to 'Stand-by' mode.

### 8.3.2 White Tone

In the White Tone sub menu the colour values for the colour temperature values can be changed.
The colour temperature mode (Normal, Delta Cool, Delta Warm) or the colour (R, G, B) can be selected with the Right/ Left cursor keys. The mode or value can be changed with the Up/Down cursor keys.
First the values for the Normal colour temperature should be selected. Range: 0-255, 128 represent the middle of the value (no offset difference). Then the offset values for the Delta Cool and Delta Warm mode can be selected. Note that the alignment values are non-linear. The range is: -50 to +50, 0 represents the middle value, (no offset difference).

Input signal strength: >=10 mV rms (80 dBµV) terminal voltage.
Input injection point: Aerial input.

***Alignment Method***

*Initial Set-up*
- 12 minutes soaking time before carrying out Colour Temp alignment.
- Incredible Picture/Contrast+ and Active Control & Light Sensor must be switched Off for proper tracking.
- Set all colour temperature settings to their initial values, i.e. Red=185; Green=180; Blue=193.
- The offset values for Cool & Warm should be preloaded into NVM.
- The alignment is done for Normal only.

*Method of alignments*
1. Place the colour sensor of the meter at the centre of the screen with standard orientation (at 0 degree orientation).
2. Set the meter in (T, delta UV, Y) mode.
3. Set Brightness and Colour to nominal (Factory mode, Brightness 60).
4. Set Colour temp to normal.
5. Set Contrast to make the light output Y on the meter 250 nit +/-10%.
6. Set Green=128.
7. Adjust Red and Blue to bring delta UV and T to the value as in the table.
8. Repeat the procedure if necessary to obtain the values as in the table.

***Expected Results***
- Measured parameters: Refer to table,
- Specifications: Refer to table,
- Units of measurement: Kelvin.

**Table 8-1 Colour temperatures**

| Colour temp. | NORMAL | | COOL | | WARM | |
|---|---|---|---|---|---|---|
| | T (K) | ∆UV | T (K) | ∆UV | T (K) | ∆UV |
| EUROPE | 8500 | -003 | 11500 | -005 | 7000 | -005 |
| Tolerance | +/-10% | +/-003 | +/-10% | +/-003 | +/-10% | +/-003 |

### 8.3.3 Tuner Adjustment

AGC (RF AGC Take Over Point)
Set pattern generator (e.g. PM5580) with colour bar pattern and connect to aerial input with RF signal amplitude - 10mV and set frequency for PAL/SECAM to 475.25 MHz. For France select the L'-signal.
- Activate the SAM-menu. Go to the sub-menu Tuner, select the sub-menu option AFC Window and adjust the value to 100kHz.
- Select the AGC sub-menu.
- Connect a DC multi-meter to F306 pin1 of the tuner.
- Adjust the AGC until the voltage at pin 1 of the tuner is 3.3 Volts +0.5 / -1.0.
- The value can be incremented or decremented by pressing the right/left Menu-button on the RC.
- Switch the set to standby to store the data.

### 8.3.4 Grey Scale Adjustment

***SDTV Grey Scale Adjustment***

*Equipment and setting*
- E.g. Fluke 54200 or Philips PM5580.
- 100% "8-step grey scale" pattern.

*Alignment Method*
- Switch with the RC to TV mode,
- Press the MUTE button on RC,
- Set SMART PICTURE to SOFT mode,
- Activate the auto colour function by pressing key-sequence:
  "INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO".

*Expected Results*
- Visual check if the 8 Grey levels are correct.

***Analog PC Grey Scale Adjustment***

*Equipment and setting*
- Quantum Data 802B.
- PC input signal, with 64 levels Grey scale pattern, 1024x768 @ 60Hz (Format= 81:DMT1060, Pattern= 123:Grey 64).
- PC input at D-sub VGA connector.

*Alignment Method*
- Switch with the RC to PC mode.
- Press the MUTE button on RC.
- Set BRIGHTNESS and CONTRAST to nominal "50".
- Activate the auto colour function by pressing key-sequence:
  "INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO".

*Expected Results*
- Visual check if the 64 Grey levels are correct.

***HD Grey Scale Adjustment***

*Equipment and setting*
- Quantum Data 802B.
- HD input signal, Top half 100% colour bar and bottom half Grey scale pattern,1920x1080i@60Hz YPbPr (Format= 1080i30, Pattern= HDBar100).
- HD input at D-sub VGA connector.

*Alignment Method*
- Switch with the RC to HD mode.
- Press the MUTE button on RC.
- Activate the auto colour function by pressing key-sequence:
  "INFO - MUTE - MUTE - MUTE - INFO - MENU - INFO".

*Expected Results*
- Visual check if Colour bar tint and Grey scale is correct.

### 8.3.5 Sound

No adjustments needed for sound.

The default values for the audio alignments are:
- QSS: On
- FMI: Off
- NICAM Alignment: 63
- Lip Sync: Off
- DBE: Off

### 8.3.6 Options

Options are used to control the presence/absence of certain features and hardware.

***How to change an Option Byte***
An Option Byte represents a number of different options. Changing these bytes directly makes it possible to set all options very fast. All options are controlled via seven option bytes. Select the option byte (OP1.. OP7) with the cursor UP/ DOWN keys, and enter the new value.

Leaving the OPTION sub menu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched “off” and “on” with the AC power switch (cold start).

**Table 8-2 Option codes (general overview for all displays)**

| Bit (DEC) | Option | Description | 23PF8946 | 20PF7846 | 20PF8846 | 17PF8946 | 15PF8946 | 14PF7846 |
|---|---|---|---|---|---|---|---|---|
| 7 (128) | OP_PHILIPS_TUNER | Philips Tuner available | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 (64) | OP_FM_RADIO | FM Radio available | 1 | 1 | 1 | 1 | 1 | 1 |
| 5 (32) | OP_LNA | Low Noise Amplifier available | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 (16) | OP_ATS | Auto Tuning System | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 (8) | OP_ACI | ACI | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 (4) | OP_UK_PNP | Activate Plug & Play menu at start-up | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 (2) | OP_VIRGIN_MODE | After virgin = English + Great Britain | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 (1) | OP_CHINA | AP-PAL tuning algorithm for China | 0 | 0 | 0 | 0 | 0 | 0 |
| **OP1 (DEC):** | | | **216** | **216** | **216** | **216** | **216** | **216** |
| **OP1 (HEX):** | | | **D8** | **D8** | **D8** | **D8** | **D8** | **D8** |
| 7 (128) | OP_SC | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 (64) | OP_UI_GREEN | UI for Magnavox sets (NAFTA) | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 (32) | OP_CHANNEL_NAMING | Naming of channel feature available | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 (16) | OP_LTI | Histogr. algorithm available (TDA9178) | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 (8) | OP_TILT | Picture Rotation available | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 (4) | OP_FINE_TUNING | Fine Tuning algorithm available | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 (2) | OP_PIP_PHILIPS_TUNER | PIP Philips tuner | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 (1) | OP_HUE | Tint for NTSC transmission | 0 | 0 | 0 | 0 | 0 | 0 |
| **OP2 (DEC):** | | | **4** | **4** | **4** | **4** | **4** | **4** |
| **OP2 (HEX):** | | | **04** | **04** | **04** | **04** | **04** | **04** |
| 7 (128) | OP_EW_FUNCTION | Geometry adj. for Large screen sets | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 (64) | OP_2TUNER_PIP | Double Tuner for PIP available | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 (32) | OP_PIP_SPLITTER | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 (16) | OP_SPLITTER | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 (8) | OP_VIRTUAL_DOLBY | Virtual Dolby Effect | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 (4) | OP_WIDE_SCREEN | 16:9 sets | 1 | 0 | 0 | 1 | 0 | 0 |
| 1 (2) | OP_WSSB | Wide Screen Signalling Bit detection | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 (1) | OP_ECO_SUBWOOFER | Sub woofer available | 0 | 0 | 0 | 0 | 0 | 0 |
| **OP3 (DEC):** | | | **142** | **136** | **136** | **142** | **136** | **136** |
| **OP3 (HEX):** | | | **8E** | **88** | **88** | **8E** | **88** | **88** |
| 7 (128) | OP_PC_MODE | VGA input available | 1 | 0 | 0 | 1 | 1 | 0 |
| 6 (64) | OP_HD | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 (32) | OP_ULTRA_BASS | Ultra Bass Boost available | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 (16) | OP_DELTA_VOLUME | Delta Volume feature available | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 (8) | OP_TAIWAN_KOREA | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 (4) | OP_VOLUME_LIMITER | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 (2) | OP_STEREO_DBX | Stereo DBX for NTSC available | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 (1) | OP_STEREO_NICAM_2CS | Stereo NICAM 2CS available | 1 | 1 | 1 | 1 | 1 | 1 |
| **OP4 (DEC):** | | | **145** | **17** | **17** | **145** | **145** | **17** |
| **OP4 (HEX):** | | | **91** | **11** | **11** | **91** | **91** | **11** |
| 7 (128) | OP_AV1 | External Source 1 available | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 (64) | OP_AV2 | External Source 2 available | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 (32) | OP_AV3 | External Source 3 (Side AV) available | 1 | 1 | 1 | 1 | 1 | 1 |
| 4 (16) | OP_CVI | Component Video In available | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 (8) | OP_SVHS2 | Super Video Home System 2 available | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 (4) | OP_SVHS3 | Super Video Home System 3 available | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 (2) | OP_HOTEL_MODE | LATAM specific simplified Hotel Mode | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 (1) | OP_SIMPLY FACTORY | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| **OP5 (DEC):** | | | **164** | **164** | **164** | **164** | **164** | **164** |
| **OP5 (HEX):** | | | **A4** | **A4** | **A4** | **A4** | **A4** | **A4** |
| 7 (128) | OP_PERSONAL_ZAPPING | Zapping of channels feature available | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 (64) | OP_SMART_SURF | Surf List available | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 (32) | OP_FMTRAP | FM trap available | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 (16) | OP_COMBFILTER | comb filter available | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 (8) | OP_ACTIVE_CONTROL | Auto Picture Impr. feature available | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 (4) | OP_VIDEO_TEXT | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 (2) | OP_LIGHT_SENSOR | Light Sensor enabled | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 (1) | OP_TWIN_TEXT | 2 txt pages on screen available | 0 | 0 | 0 | 0 | 0 | 0 |
| **OP6 (DEC):** | | | **16** | **16** | **16** | **16** | **16** | **16** |
| **OP6 (HEX):** | | | **10** | **10** | **10** | **10** | **10** | **10** |
| 7 (128) | OP_TIME_WIN1 | 1= 5 s, 0= 2 s (Europe fixed 1.2 s) | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 (64) | OP_MALAY | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 (32) | OP_THAI | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 (16) | OP_3D_COMBFILTER | 3D comb filter available | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 (8) | OP_DUMMY6 | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 (4) | OP_DUMMY7 | Not used | 0 | 0 | 0 | 0 | 0 | 0 |
| /12 | | | | | | | | |
| 1 (2) | OP_WEST_EU | West Europe Set (0 - East Europe Set) by default "on" | 1 | 1 | 1 | 1 | 1 | 1 |
| 0 (1) | OP_MULTI_STANDARD_EUR | For Europe multi standard set | 1 | 1 | 1 | 1 | 1 | 1 |
| /58 | | | | | | | | |
| 1 (2) | OP_WEST_EU | West Europe Set (0 - East Europe Set) by default "on" | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 (1) | OP_MULIT_STANDARD_EUR | For Europe multi standard set | 1 | 1 | 1 | 1 | 1 | 1 |
| **OP7 (DEC):** | | | **1/3** | **1/3** | **1/3** | **1/3** | **1/3** | **1/3** |
| **OP7 (HEX):** | | | **01/03** | **01/03** | **01/03** | **01/03** | **01/03** | **01/03** |

# 9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter


## 9.1 Introduction

The LC4.1 LCD TV is a global LCD TV for the year 2004. It is the successor of the LC13 LCD TV and covers screens sizes 14, 15, 17, 20 and 23 inch (in both 4:3 and 16:9 ratio) with SP2 and ARCH3 styling.
This chassis has the following (new) features:

- **Audio**: The sound processor is part of the UOC processor (called “Hercules”). The chassis has a FM Radio with 40 preset channels.
- **Video**: Enhanced video features, video drivers and Active Control.

The architecture consists of a TV and Scaler panel with I/O, Side I/O panel, Sound Amplifier Panel, Top Control Panel and Power Supply panel.
The functions for video/audio processing, microprocessor (P), and CC/Teletext (TXT) decoder are all combined in one IC (TDA120xx, item 7011), the so-called third generation Ultimate One Chip (UOC-III) or “Hercules”. This chip has the following features:

- Control, small signal, mono/stereo, and extensive Audio/ Video switching in one IC.
- Upgrade with digital sound & video processing.
- Alignment free IF, including SECAM-L/L1 and AM.
- FM sound 4.5/5.5/6.0/6.5, no traps/bandpass filters.
- Full multi-standard color decoder.
- One Xtal reference for all functions (microprocessor, RCP, TXT/CC, RDS, color decoder, and stereo sound processor).

## 9.2 Block Diagram

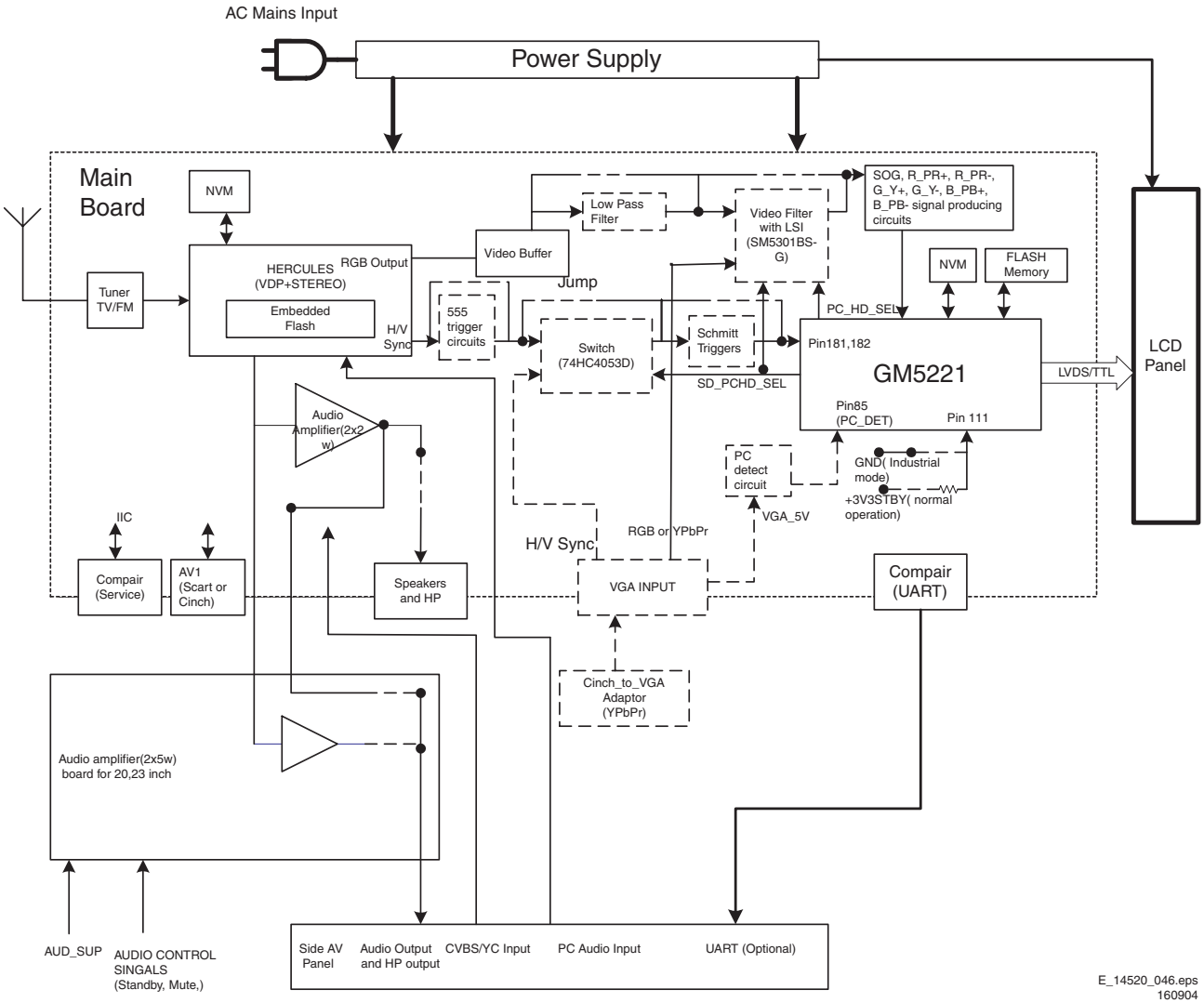



**Figure 9-1 Block Diagram LC4.1**

The PLL tuner UR1316 (with FM radio) delivers the IF-signal, via audio & video SAW-filters, to the Video Signal Processor and FLASH embedded TEXT/Control/Graphics Micro Controller TDA120x1 (item 7011, also called Hercules). This IC has the following functions:

- Analogue Video Processing
- Sound Demodulation
- Audio Interfaces and switching
- Volume and tone control for loudspeakers
- Reflection and delay for loudspeaker channels
- Micro Controller
- Data Capture
- Display

The Hercules has one input for the internal CVBS signal and a video switch with 3 external CVBS inputs and a CVBS output. All CVBS inputs can be used as Y-input for Y/C signals. However, only 2 Y/C sources can be selected because the circuit has 2 chroma inputs. It is possible to add an additional CVBS(Y)/C input (CVBS/YX and CX) when the YUV interface and the RGB/YPRPB input are not needed. One SCART-connector is used (SCART1). This connector is fully equipped. The video part delivers the RGB signals to the Scaler IC.

The Genesis GM5221 Scaler IC receives either the SDTV video input signals from the Hercules or the PC input signal from an external computer. Switching between the two signals is done via the SD/HD selection IC (7461).
After the video processing done by the Scaler, the digital data is sent via a Low Voltage Differential Signalling bus to the LCD panel. LVDS is used to improve data speed and to reduce EMI significantly.
There are two I2C lines and two interrupt and communication lines (TV_IRQ and TV_SC_COM) for the Scaler control. The Scaler communicates with the Hercules as a slave device. To avoid buffer overflow at the Scaler side, the TV_SC_COM line provides the necessary hardware flow control. To allow bi-directional communication, the Scaler can initiate a service interrupt-request to the Hercules via the TV_IRQ line.

The Hercules, and EEPROM are supplied with 3.3 V, which is also present during STANDBY.
The EEPROM, or NVM (Non Volatile Memory) is used to store the settings.

The sound part is built up around the Hercules. The Source Selection, Decoding and Processing are all done by the Hercules.

Power supply input are several DC voltages coming from a supply panel.

## 9.3 Power Supply

For Service, this supply panel is a black box. When defect (this can be traced via the fault-finding tips, or by strange phenomena), a new panel must be ordered (see table below for ordering codes), and after receipt, the defective panel must be send for repair.

**Table 9-1 Ordering Codes Power Supply**

| Screen size (inches) | Ordering Code |
|---|---|
| 14 | 3341 101 20010 |
| 15 | 3341 101 20020 |
| 17 | 3122 137 23040 |
| 20 | 3122 137 23100 |
| 23 | 3122 137 23070 |

## 9.4 Input/Output

The I/O is divided over two parts: Rear I/O and Side I/O. The rear I/O is integrated in the TV & Scaler board.

**Table 9-2 I/O Connectivity**

| Screen size (inches) | Rear I/O | | Side I/O | | | |
|---|---|---|---|---|---|---|
| | Scart | VGA | Y/C | CVBS + L/R | HP | PC Audio |
| 14 | X | | X | X | X | |
| 15 | X | X | X | X | X | X |
| 17 | X | X | X | X | X | X |
| 20 | X | | X | X | | |
| 23 | X | X | X | X | X | X |

## 9.5 Tuner and IF

A Philips UR13xx Tuner with second input (for FM Radio) is used in the TV board. The SIF and FM signals are decoded by the Hercules. Tuning is done via I2C.

### 9.5.1 Video IF amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (1328) and one for IF-audio (1330). The type of these filters is depending of the standard(s) that has to be received.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 31 of the Hercules to pin 1 of the tuner. The AGC-detector operates on top sync and top white level. AGC take-over point is adjusted via the service alignment mode 'Tuner' - 'AGC'. If there is too much noise in the picture, then it could be that the AGC setting is wrong. The AGC-setting could also be mis-aligned if the picture deforms with perfect signal; the IF-amplifier amplifies too much.

## 9.6 Video: TV Part (diagrams A1, A2, and A3)

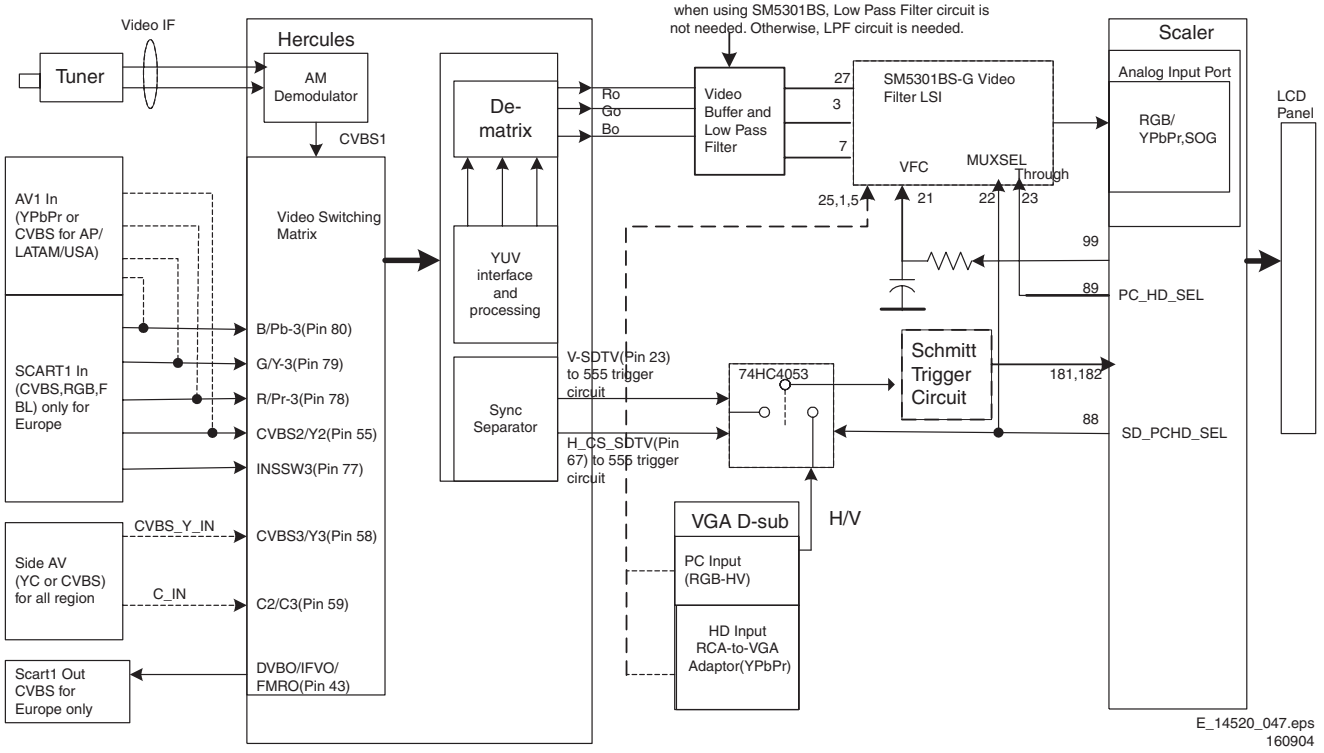



**Figure 9-2 Block diagram video processing**

The video processing is completely handled by the Hercules

- IF demodulator.
- Chrominance decoder
- Sync separator.
- Horizontal & vertical drive.
- RGB processing.
- CVBS and SVHS source select.

It has also build in features like:

- CTI.
- Black stretch.
- Blue stretch.
- White stretch.
- Slow start up.
- Dynamic skin tone correction etc.

Further, it also incorporates sound IF traps and filters, and requires only one crystal for all systems.

## 9.7 Video: Scaler Part (diagram A6, A7, and A8)

The Genesis gm5221 Scaler is an all-in-one graphics and video processing IC for LCD monitors and televisions with up to XGA output resolutions. The Scaler controls the display processing in an LCD TV, e.g. like the deflection circuit in a CRT-based TV. It controls all the view modes (e.g. like "zooming" and "shifting"). Features like PC (VGA) or HD inputs, are also handled by this part.

### 9.7.1 Features

The Scaler provides several key IC functions:

- Scaling.
- Auto-configuration/ Auto-Detection.
- Various Input Ports:
  - Analog RGB.
  - Video Graphics.
- Integrated LVDS Transmitter.
- On-chip Micro-controller

### 9.7.2 Inputs

***Analog RGB***

The RGB input is fed to pins 142, 143, 147, 148, 151 and 152. This input consists of either the Hercules RGB output or the RGB/YpbPr input of the VGA connector. The Scaler can switch between the two signals via the PC_HD_SEL signal and selection IC SM5301 (7461).

***PC (VGA) input***

The VGA input is processed by the VGA block of the Scaler. The Scaler supports up to 1080i and UXGA 60Hz formats.

***DVI-D input***

The DVI-D input is not supported by this chassis.

### 9.7.3 Output

The Display Output Port provides data and control signals that permit the Scaler to connect to a variety of display devices using a TTL or LVDS interface. The output interface has four channel 6/8-bit LVDS transmitters and is configurable for single or dual wide LVDS. All display data and timing signals are synchronous with the DCLK output clock. The integrated LVDS transmitter is programmable to allow the data and control signals to be mapped into any sequence depending on the specified receiver format.

## 9.8 Audio Processing

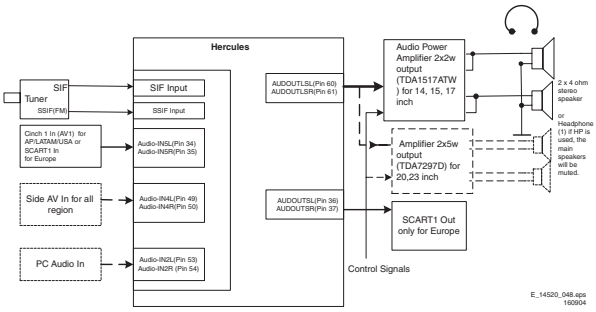



**Figure 9-3 Block diagram audio processing**

The audio decoding is done entirely via the Hercules. The IF output from the Tuner is fed directly to either the Video-IF or the Sound-IF input depending on the type of concept chosen. There are mainly two types of decoder in the Hercules, an analogue decoder that decodes only Mono, regardless of any standards, and a digital decoder (or DEMDEC) that can decode both Mono as well as Stereo, again regardless of any standards.

In this chassis, the analogue decoder is used in two cases:
- It is used for AM Sound demodulation in the Europe SECAM LL' transmission.
- It is used for all FM demodulation in AV-Stereo sets.

### 9.8.1 Diversity

The diversity for the Audio decoding can be broken up into two main concepts:
- The Quasi Split Sound concept used in Europe and some AP sets.
- The Inter Carrier concept, used in NAFTA and LATAM.

The UOC-III family makes no difference anymore between QSS- and Intercarrier IF, nearly all types are software-switchable between the two SAW-filter constructions.

Simple data settings are required for the set to determine whether it is using the Inter Carrier or the QSS concept. These settings are done via the "QSS" and "FMI" bit found in SAM mode. Due to the diversity involved, the data for the 2 bits are being placed in the NVM location and it is required to write once during startup.

On top of that, it can be further broken down into various systems depending on the region. The systems or region chosen, will in turn affect the type of sound standard that is/are allowed to be decoded.
- For the case of Europe, the standard consists of BG/DK/I/LL' for a Multi-System set. There are also versions of Eastern Europe and Western Europe set and the standard for decoding will be BG/DK and I/DK respectively. FM Radio is a feature diversity for the Europe sets. The same version can have either FM Radio or not, independent of the system (e.g. sets with BG/DK/I/LL' can have or not have FM radio).
- For the case of NAFTA and LATAM, there is only one transmission standard, which is the M standard. The diversity then will be based on whether it has a dBx noise reduction or a Non-dBx (no dBx noise reduction).
- For the case of AP, the standard consists of BG/DK/I/M for a Multi-System set. The diversity here will then depends on the region. AP China can have a Multi-System and I/DK version. For India, it might only be BG standard.

### 9.8.2 Functionality

The features available in the Hercules are as follows:
- Treble and Bass Control.
- Surround Sound Effect that includes:
  - Incredible Stereo.
  - Incredible Mono.
  - 3D Sound (not for AV Stereo).
  - TruSurround (not for AV Stereo).
  - Virtual Dolby Surround, VDS422 (not for AV Stereo).
  - Virtual Dolby Surround, VDS423 (not for AV Stereo).
  - Dolby Pro-Logic (not for AV Stereo).
- Bass Feature that includes:
  - Dynamic Ultra-Bass.
  - Dynamic Bass Enhancement.
  - BBE (not for AV Stereo).
- Auto-Volume Leveler.
- 5 Band Equalizer.
- Loudness Control.

All the features stated are available for the Full Stereo versions and limited features for the AV Stereo

### 9.8.3 Audio Amplifier

The audio amplifier part is very straightforward. There are two different executions:
- **14, 15, 17 inch:** Amplification is done via the integrated power amplifier TDA1517, and delivers a maximum output of 2 x 6 W_rms. Normal operating supply is from 6 V to 18 V.
- **20, 23 inch:** Amplification is done via the integrated power amplifier TDA7297, and delivers a maximum output of 2 x 15 W_rms. Normal operating supply is from 6.5 V to 18 V.

Muting is done via the SOUND_ENABLE line connected to pin 13 of the amplifier-IC and coming from the Hercules.

### 9.8.4 Audio: Lip Sync

The LC4.1E is not equipped with Lip Sync. This is not needed.

## 9.9 Control

### 9.9.1 Hercules

The System Board has two main micro-controllers on board. These are:
- On-chip x86 micro-controller (OCM) from Genesis LCD TV/ Monitor Controller.
- On-chip 80C51 micro-controller from Philips Semiconductor UOCIII (Hercules) series.

Each micro-controller has it own I2C bus which host its own internal devices.
The Hercules is integrated with the Video and Audio Processor. For dynamic data storage, such as SMART PICTURE and SMART SOUND settings, an external NVM IC is being used. Another feature includes an optional Teletext/Closed Caption decoder with the possibility of different page storage depending on the Hercules type number.

The Micro Controller ranges in ROM from 128 kB with no TXT-decoder to 128 kB with a 10 page Teletext or with Closed Caption.

### 9.9.2 Block Diagram

The block diagram of the Micro Controller application is shown below.

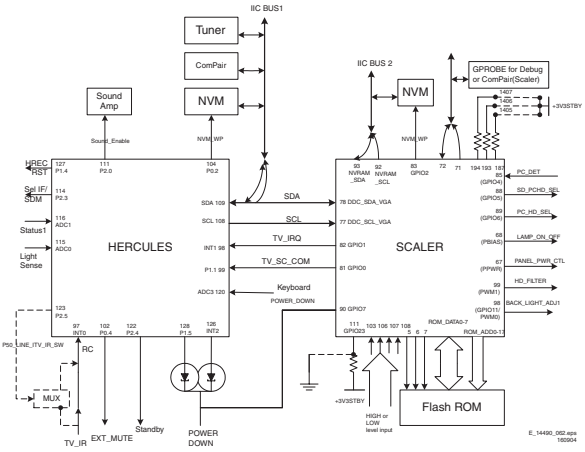



**Figure 9-4 Micro Controller block diagram**

### 9.9.3 Basic Specification

The Micro Controller operates at the following supply voltages:
- +3.3 V_dc at pins 4, 88, 94, and 109.
- +1.8 V_dc at pins 93, 96, and 117.
- I2C pull up supply: +3.3V_dc.

### 9.9.4 Pin Configuration and Functionality

The ports of the Micro Controller can be configured as follows:
- A normal input port.
- An input ADC port.
- An output Open Drain port.
- An output Push-Pull port.
- An output PWM port.
- Input/Output Port

## 9.10 LCD Display

### 9.10.1 Specifications

| | | |
|---|---|---|
| Panel model | : | T140VN01 (14”) |
| | : | LC150X02 (15”) |
| | : | LC171W03 (17”) |
| | : | LC201V02 (20”) |
| | : | QD23WL04 (23”) |
| Resolution (HxV) | : | 640x480 pixels (14”) |
| | : | 1024x768 pixels (15”) |
| | : | 1280x768 pixels (17”) |
| | : | 640x480 pixels (20”) |
| | : | 1280x768 (23”) |
| Luminance | : | 450 nit (14”) |
| | : | 450 nit (15”) |
| | : | 450 nit (17”) |
| | : | 450 nit (20”) |
| | : | 450 nit (23”) |
| Supplier | : | AU Optronics Corp (14”) |
| | : | LG.Philips LCD (15”, 17”, 20”) |
| | : | Quanta Displays Inc (23”) |

## 9.11 Abbreviation list

| | |
|---|---|
| 0/6/12 | SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format |
| 1080i | 1080 visible lines, interlaced |
| 1080p | 1080 visible lines, progressive scan |
| 2CS | 2 Carrier Stereo |
| 480i | 480 visible lines, interlaced |
| 480p | 480 visible lines, progressive scan |
| ACI | Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page |
| ADC | Analogue to Digital Converter |
| AFC | Automatic Frequency Control: control signal used to tune to the correct frequency |
| AGC | Automatic Gain Control: algorithm that controls the video input of the feature box |
| AM | Amplitude Modulation |
| AP | Asia Pacific |
| AR | Aspect Ratio: 4 by 3 or 16 by 9 |
| ASD | Automatic Standard Detection |
| AV | Audio Video |
| B-SC1-IN | Blue SCART1 in |
| B-SC2-IN | Blue SCART2 in |
| B-TXT | Blue teletext |
| B/G | Monochrome TV system. Sound carrier distance is 5.5 MHz |
| BOCMA | Bimos one Chip Mid-end Architecture: video and chroma decoder |
| C-FRONT | Chrominance front input |
| CBA | Circuit Board Assembly (or PWB) |
| CL | Constant Level: audio output to connect with an external amplifier |
| CLUT | Colour Look Up Table |
| ComPair | Computer aided rePair |
| CSM | Customer Service Mode |
| CVBS | Composite Video Blanking and Synchronisation |
| CVBS-EXT | CVBS signal from external source (VCR, VCD, etc.) |
| CVBS-INT | CVBS signal from Tuner |
| CVBS-MON | CVBS monitor signal |
| CVBS-TER-OUT | CVBS terrestrial out |
| DAC | Digital to Analogue Converter |
| DBE | Dynamic Bass Enhancement: extra low frequency amplification |
| DFU | Directions For Use: owner's manual |
| DNR | Dynamic Noise Reduction |
| DRAM | Dynamic RAM |
| DSP | Digital Signal Processing |
| DST | Dealer Service Tool: special (European) remote control designed for service technicians |
| DTS | Digital Theatre Sound |
| DVD | Digital Video Disc |
| EEPROM | Electrically Erasable and Programmable Read Only Memory |
| EPG | Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTView) |
| EPLD | Electronic Programmable Logic Device |
| EU | EUrope |
| EXT | EXTernal (source), entering the set by SCART or by cinches (jacks) |
| FBL | Fast Blanking: DC signal accompanying RGB signals |
| FBL-SC1-IN | Fast blanking signal for SCART1 in |
| FBL-SC2-IN | Fast blanking signal for SCART2 in |

| | |
|---|---|
| FBL-TXT | Fast Blanking Teletext |
| FLASH | FLASH memory |
| FM | Field Memory / Frequency Modulation |
| FMR | FM Radio |
| FRC | Frame Rate Converter |
| FRONT-C | Front input chrominance (SVHS) |
| FRONT-DETECT | Front input detection |
| FRONT-Y_CVBS | Front input luminance or CVBS (SVHS) |
| G-SC1-IN | Green SCART1 in |
| G-SC2-IN | Green SCART2 in |
| G-TXT | Green teletext |
| H | H_sync to the module |
| HA | Horizontal Acquisition: horizontal sync pulse coming out of the BOCMA |
| HD | High Definition |
| HP | HeadPhone |
| I | Monochrome TV system. Sound carrier distance is 6.0 MHz |
| I2C | Integrated IC bus |
| I2S | Integrated IC Sound bus |
| IC | Integrated Circuit |
| IF | Intermediate Frequency |
| Interlaced | Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker. |
| IR | Infra Red |
| IRQ | Interrupt ReQuest |
| Last Status | The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according the customers wishes |
| LATAM | LATin AMerica |
| LC04 | Philips chassis name for LCD TV 2004 project |
| LCD | Liquid Crystal Display |
| LED | Light Emitting Diode |
| LINE-DRIVE | Line drive signal |
| L/L' | Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I |
| LS | LoudSpeaker |
| LVDS | Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication. |
| M/N | Monochrome TV system. Sound carrier distance is 4.5 MHz |
| MOSFET | Metal Oxide Semiconductor Field Effect Transistor |
| MPEG | Motion Pictures Experts Group |
| MSP | Multi-standard Sound Processor: ITT sound decoder |
| MUTE | MUTE Line |
| NC | Not Connected |
| NICAM | Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, used mainly in Europe. |
| NTSC | National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air) |
| NVM | Non Volatile Memory: IC containing TV related data (for example, options) |
| O/C | Open Circuit |
| ON/OFF LED | On/Off control signal for the LED |
| OSD | On Screen Display |
| P50 | Project 50 communication: protocol between TV and peripherals |
| PAL | Phase Alternating Line. Colour system used mainly in Western Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz) |
| PC | Personal Computer |
| PCB | Printed Circuit Board (or PWB) |
| PIG | Picture In Graphic |
| PIP | Picture In Picture |
| PLL | Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency |
| Progressive Scan | Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution. |
| PWB | Printed Wiring Board (or PCB) |
| RAM | Random Access Memory |
| RC | Remote Control transmitter |
| RC5 | Remote Control system 5, the signal from the remote control receiver |
| RGB | Red, Green, and Blue. The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced. |
| RGBHV | Red, Green, Blue, Horizontal sync, and Vertical sync |
| ROM | Read Only Memory |
| SAM | Service Alignment Mode |
| SIF | Sound Intermediate Frequency |
| SC | SandCastle: two-level pulse derived from sync signals |
| SC1-OUT | SCART output of the MSP audio IC |
| SC2-B-IN | SCART2 Blue in |
| SC2-C-IN | SCART2 chrominance in |
| SC2-OUT | SCART output of the MSP audio IC |
| S/C | Short Circuit |
| SCART | Syndicat des Constructeurs d'Appareils Radiorecepteurs et Televisieurs |
| SCL | CLock Signal on I2C bus |
| SD | Standard Definition |
| SDA | DAta Signal on I2C bus |
| SDRAM | Synchronous DRAM |
| SECAM | SEequence Couleur Avec Memoire. Colour system used mainly in France and Eastern Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz |
| SIF | Sound Intermediate Frequency |
| SMPS | Switch Mode Power Supply |
| SND | SouND |
| SNDL-SC1-IN | Sound left SCART1 in |
| SNDL-SC1-OUT | Sound left SCART1 out |
| SNDL-SC2-IN | Sound left SCART2 in |
| SNDL-SC2-OUT | Sound left SCART2 out |
| SNDR-SC1-IN | Sound right SCART1 in |
| SNDR-SC1-OUT | Sound right SCART1 out |
| SNDR-SC2-IN | Sound right SCART2 out |
| SNDR-SC2-OUT | Sound right SCART2 out |
| SNDS-VL-OUT | Surround sound left variable level out |
| SNDS-VR-OUT | Surround sound right variable level out |
| SOPS | Self Oscillating Power Supply |
| S/PDIF | Sony Philips Digital InterFace |
| SRAM | Static RAM |
| STBY | STandBY |
| SVHS | Super Video Home System |
| SW | SubWoofer / SoftWare |
| THD | Total Harmonic Distortion |
| TXT | TeleteXT |
| uP | Microprocessor |
| VA | Vertical Acquisition |
| VL | Variable Level out: processed audio output toward external amplifier |

| | |
|---|---|
| VCR | Video Cassette Recorder |
| VGA | Video Graphics Array |
| WD | Watch Dog |
| WYSIWYR | What You See Is What You Record: record selection that follows main picture and sound |
| XTAL | Quartz crystal |
| YPbPr | Component video (Y= Luminance, Pb/Pr= Colour difference signals) |
| Y/C | Luminance (Y) and Chrominance (C) signal |
| Y-OUT | Luminance-signal |
| YUV | Component video |

## 9.12 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

### 9.12.1 Diagram A7, Type GM5221 (IC7401)

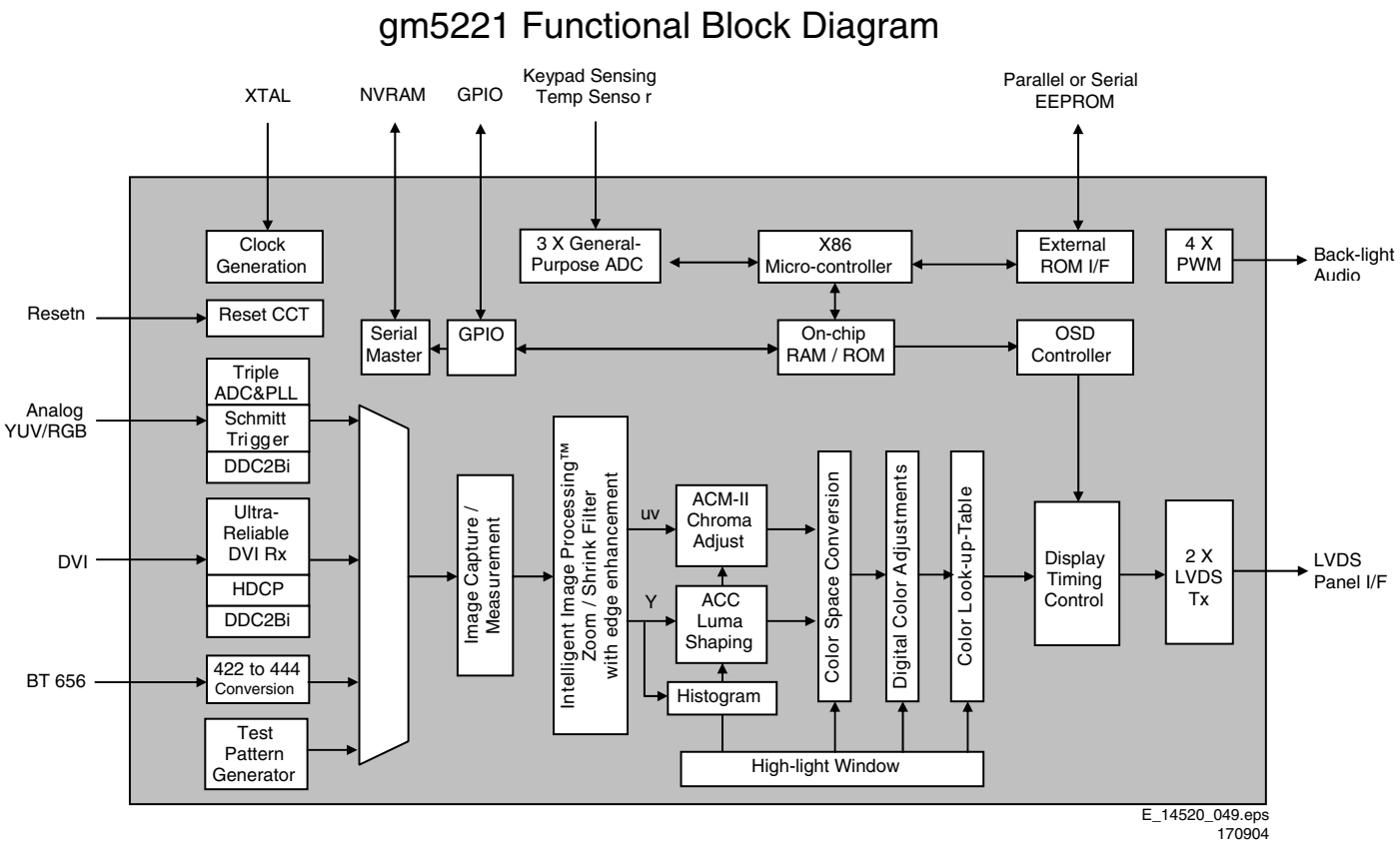
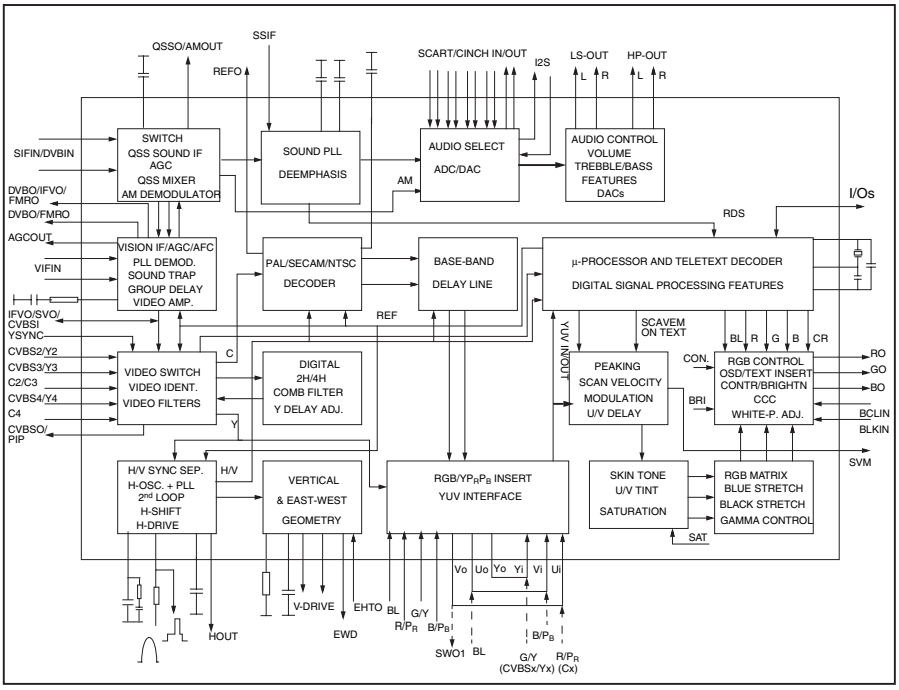



**Figure 9-5 Internal Block Diagram**

### 9.12.2 Diagram A2, Type TDA12029H (IC7011)

Block diagram of the “AV-stereo” TV processor with audio DSP




Pin configuration “stereo” and “AV-stereo” versions with Audio DSP

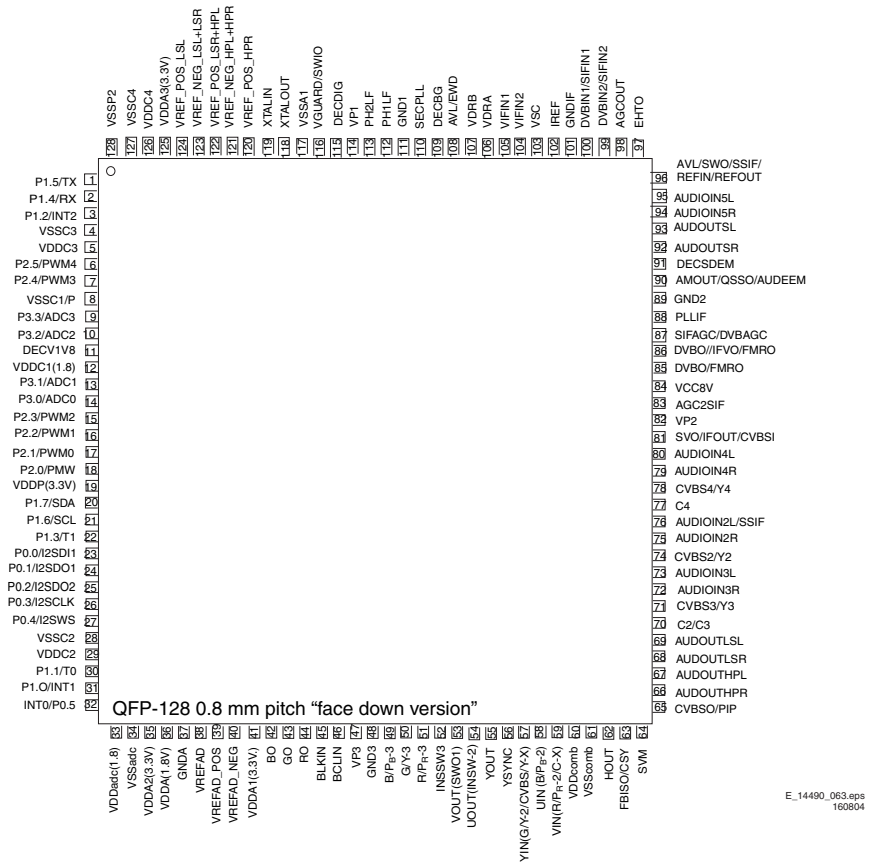
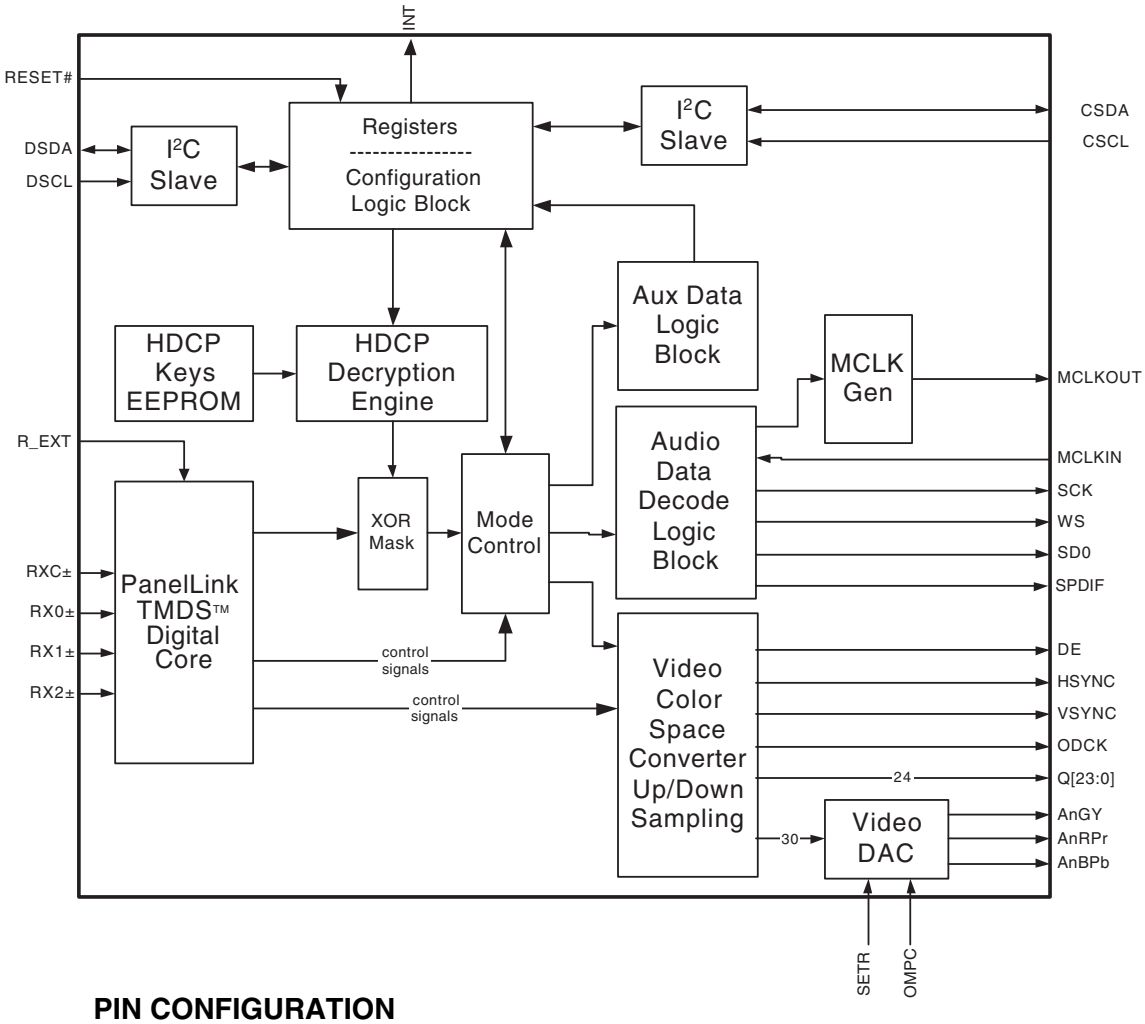


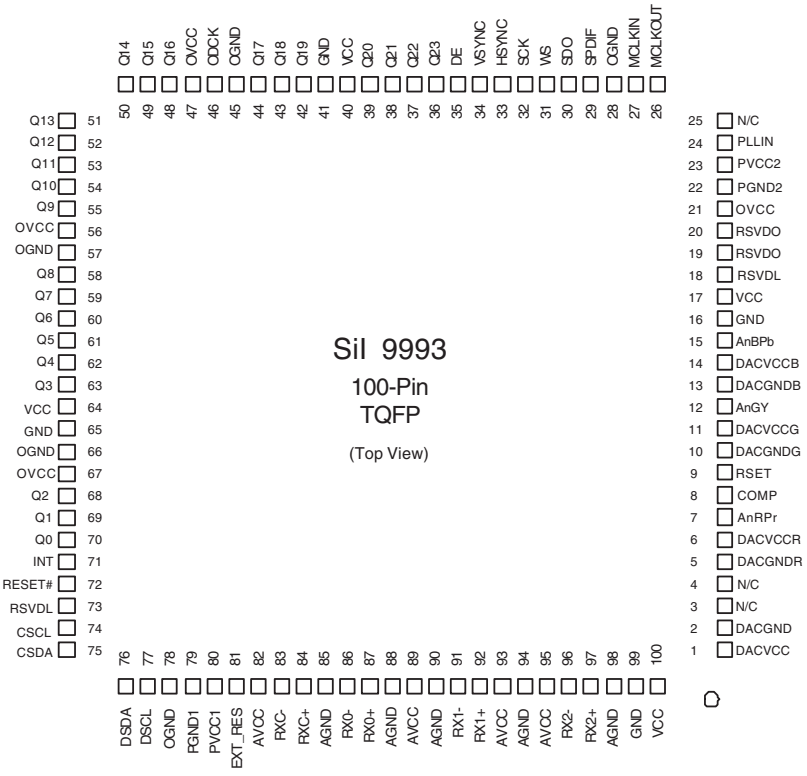

**Figure 9-6 Internal Block Diagram and Pin Configuration**

### 9.12.3 Diagram A12, Type S9993CT (IC7808)

BLOCK DIAGRAM




## PIN CONFIGURATION




E_14620_149.eps
090804

**Figure 9-7 Internal Block Diagram and Pin Configuration**

# 10. Spare Parts List

## Set Level

### Various

| | | |
|---|---|---|
| 8402 | 3139 131 03981 | Cable 41p 150 |
| 8404⚠ | 3139 131 03991 | Cable 20p 150 |
| 8870⚠ | 3139 110 27891 | Cable 6p 400 |
| 8870 | 3139 131 04201 | Cable 6p 480 |
| 8870 | 3139 131 04211 | Cable 6p 560 |
| 0096 | 2422 076 00546 | Cable FM aerial |
| 1910 | 3128 147 15821 | RC1553801/01 |
| 8105 | 3104 311 09351 | Cable 4P |
| 8105⚠ | 3139 131 04231 | Cable 4p 280 |
| 8105 | 3139 131 04831 | Cable 4p 220 |
| 8191 | 2422 076 00474 | Cable 2p/1500/2p |
| 8193 | 2422 076 00585 | Cable 1.5M |

## TV & Scaler board [A]

### Various

| | | |
|---|---|---|
| 1001 | 2422 543 01414 | Xtal 24M576 |
| 1007 | 2422 025 08149 | Connector 6p m |
| 1008 | 2422 025 09405 | Connector 2p m |
| 1010 | 2422 025 16963 | Connector 10p m |
| 1101 | 4822 265 10703 | Socket scart 21p |
| 1302⚠ | 3139 147 19701 | UR1316/A I H-3 |
| 1328 | 2422 549 44372 | SAW 38.9MHz K3953L |
| 1330 | 2422 549 44369 | SAW 38.9MHz K9656L |
| 1331 | 4822 267 10748 | Connector 3p |
| 1401 | 2422 025 09406 | Connector 4p m |
| 1402 | 2422 025 18024 | Connector 40p m |
| 1403 | 2422 543 01374 | Xtal 14.318 Mhz |
| 1404 | 2422 025 18314 | Connector 20p m v 1.25 |
| 1461 | 2422 025 18477 | Socket sub-D 15p f h |
| 1701 | 2422 025 10768 | Connector 3p m |
| 1706 | 2422 025 16966 | Connector 5p m |
| 1910 | 2422 025 16705 | Connector 12p m |
| 1951 | 2422 025 16702 | Connector 5p m h |
| 8706 | 3104 157 02361 | Cable 5p 280 |
| 8910 | 3139 131 04311 | Cable 12p 180 |
| 8910 | 3139 131 04321 | Cable 12p 140 |
| 8951 | 3139 110 35861 | Cable 5p 220 |

⊣⊢

| | | |
|---|---|---|
| 2001 | 4822 126 13879 | 220nF +80-20% 16V |
| 2003 | 4822 124 80151 | 47µF 16V |
| 2004 | 4822 126 13879 | 220nF +80-20% 16V |
| 2005 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2006 | 4822 126 14487 | 8.2pF 0.5% 50V 0603 |
| 2007 | 4822 126 14487 | 8.2pF 0.5% 50V 0603 |
| 2008 | 3198 017 44740 | 470nF 10V 0603 |
| 2009 | 3198 017 41050 | 1µF 10V 0603 |
| 2010 | 5322 126 11582 | 6.8nF 10% 63V |
| 2011 | 4822 126 13879 | 220nF +80-20% 16V |
| 2012 | 4822 124 12095 | 100µF 20% 16V |
| 2013 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2014 | 2020 552 94427 | 100pF 5% 50V |
| 2015 | 2020 552 00002 | 3.3nF 2% 50V 0805 |
| 2016 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2017 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2018 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2019 | 2222 867 15339 | 33pF 5% 50V 0603 |
| 2020 | 2222 867 15339 | 33pF 5% 50V 0603 |
| 2021 | 2222 867 15339 | 33pF 5% 50V 0603 |
| 2022 | 2222 867 15339 | 33pF 5% 50V 0603 |
| 2023 | 4822 126 13879 | 220nF +80-20% 16V |
| 2024 | 4822 124 12095 | 100µF 20% 16V |
| 2025 | 2222 867 15339 | 33pF 5% 50V 0603 |
| 2026 | 2222 867 15339 | 33pF 5% 50V 0603 |
| 2027 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2028 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2029 | 2020 552 00002 | 3.3nF 2% 50V 0805 |
| 2030 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2031 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2032 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2033 | 4822 126 13879 | 220nF +80-20% 16V |
| 2034 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2035 | 4822 124 12095 | 100µF 20% 16V |
| 2036 | 4822 126 11785 | 47pF 5% 50V 0603 |
| 2037 | 4822 126 11785 | 47pF 5% 50V 0603 |
| 2040 | 4822 126 13883 | 220pF 5% 50V |
| 2041 | 4822 126 13879 | 220nF +80-20% 16V |
| 2042 | 2020 552 00002 | 3.3nF 2% 50V 0805 |
| 2043 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2044 | 4822 126 13879 | 220nF +80-20% 16V |
| 2045 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2046 | 4822 126 11669 | 27pF 5% 50V 0603 |
| 2047 | 4822 126 11669 | 27pF 5% 50V 0603 |
| 2048 | 4822 126 11669 | 27pF 5% 50V 0603 |
| 2049 | 4822 124 23002 | 10µF 16V |
| 2050 | 4822 122 33761 | 22pF 5% 50V |
| 2051 | 4822 124 23002 | 10µF 16V |
| 2052 | 3198 016 31020 | 1nF 25V 0603 |
| 2053 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2054 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2055 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2056 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2057 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2058 | 3198 016 31020 | 1nF 25V 0603 |
| 2060 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2061 | 4822 124 23002 | 10µF 16V |
| 2063 | 3198 017 31540 | 150nF 10V 0603 |
| 2067 | 3198 016 31020 | 1nF 25V 0603 |
| 2068 | 4822 126 13879 | 220nF +80-20% 16V |
| 2071 | 4822 124 12095 | 100µF 20% 16V |
| 2072 | 4822 126 13879 | 220nF +80-20% 16V |
| 2073 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2074 | 4822 126 13879 | 220nF +80-20% 16V |
| 2076 | 4822 126 13879 | 220nF +80-20% 16V |
| 2077 | 3198 017 41050 | 1µF 10V 0603 |
| 2078 | 2020 552 94427 | 100pF 5% 50V |
| 2079 | 2238 916 15641 | 22nF 10% 25V 0603 |
| 2082 | 3198 017 41050 | 1µF 10V 0603 |
| 2083 | 2020 552 96637 | 10µF 10% 6.3V 0805 |
| 2099 | 3198 016 31020 | 1nF 25V 0603 |
| 2101 | 4822 126 14241 | 330pF 0603 50V |
| 2102 | 4822 126 14491 | 2.2µF 10V 0805 |
| 2103 | 4822 126 14241 | 330pF 0603 50V |
| 2104 | 4822 126 14491 | 2.2µF 10V 0805 |
| 2105 | 4822 126 14241 | 330pF 0603 50V |
| 2106 | 4822 126 14491 | 2.2µF 10V 0805 |
| 2107 | 4822 126 14241 | 330pF 0603 50V |
| 2108 | 4822 126 14491 | 2.2µF 10V 0805 |
| 2302 | 4822 122 33761 | 22pF 5% 50V |
| 2303 | 4822 122 33761 | 22pF 5% 50V |
| 2307 | 3198 017 34730 | 47nF 16V 0603 |
| 2308 | 3198 030 82280 | 2.2µF 20% 50V |
| 2309 | 2020 012 93761 | 330µF 6.3V |
| 2311 | 3198 030 72290 | 22µF 20% 35V |
| 2313 | 3198 016 31020 | 1nF 25V 0603 |
| 2314 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2317 | 3198 016 31020 | 1nF 25V 0603 |
| 2318 | 3198 016 31020 | 1nF 25V 0603 |
| 2321 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2324 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2355 | 3198 030 82280 | 2.2µF 20% 50V |
| 2356 | 3198 030 82280 | 2.2µF 20% 50V |
| 2357 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2358 | 5322 126 11579 | 3.3nF 10% 63V |
| 2359 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2370 | 3198 017 41050 | 1µF 10V 0603 |
| 2371 | 3198 017 41050 | 1µF 10V 0603 |
| 2372 | 3198 016 31020 | 1nF 25V 0603 |
| 2373 | 3198 016 31020 | 1nF 25V 0603 |
| 2374 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2375 | 4822 124 12082 | 10µF 20% 50V |
| 2376 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2377 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2378 | 4822 126 13879 | 220nF +80-20% 16V |
| 2379 | 4822 126 13879 | 220nF +80-20% 16V |
| 2380 | 4822 124 12095 | 100µF 20% 16V |
| 2381 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2382 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2383 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2384 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2385 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2387 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2388 | 2020 012 93761 | 330µF 6.3V |
| 2389 | 4822 126 11785 | 47pF 5% 50V 0603 |
| 2390 | 4822 126 11785 | 47pF 5% 50V 0603 |
| 2391 | 4822 126 11785 | 47pF 5% 50V 0603 |
| 2394 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2395 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2396 | 4822 124 23002 | 10µF 16V |
| 2397 | 3198 017 41050 | 1µF 10V 0603 |
| 2398 | 3198 017 41050 | 1µF 10V 0603 |
| 2399 | 4822 126 11785 | 47pF 5% 50V 0603 |
| 2401 | 4822 124 11131 | 47µF 6.3V |
| 2402 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2403 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2404 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2405 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2406 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2407 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2408 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2409 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2410 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2411 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2412 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2413 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2414 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2415 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2416 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2417 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2418 | 4822 126 13883 | 220pF 5% 50V |
| 2419 | 4822 126 13883 | 220pF 5% 50V |
| 2420 | 4822 124 11131 | 47µF 6.3V |
| 2421 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2422 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2423 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2424 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2425 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2426 | 4822 126 13883 | 220pF 5% 50V |
| 2427 | 4822 126 13883 | 220pF 5% 50V |
| 2428 | 4822 124 11131 | 47µF 6.3V |
| 2429 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2430 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2431 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2432 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2433 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2434 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2435 | 4822 126 13883 | 220pF 5% 50V |
| 2436 | 4822 126 13883 | 220pF 5% 50V |
| 2437 | 4822 124 11131 | 47µF 6.3V |
| 2438 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2439 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2440 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2441 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2442 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2443 | 3198 016 35680 | 5.6pF 0.5pF 50V 0603 |
| 2444 | 3198 016 35680 | 5.6pF 0.5pF 50V 0603 |
| 2445 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2448 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2451 | 2222 867 15339 | 33pF 5% 50V 0603 |
| 2460 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2461 | 4822 122 33761 | 22pF 5% 50V |
| 2462 | 4822 122 33761 | 22pF 5% 50V |
| 2463 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2464 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2465 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2466 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2467 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2468 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2469 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2470 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2471 | 4822 124 11131 | 47µF 6.3V |
| 2472 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2473 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2474 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2475 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2477 | 3198 017 41050 | 1µF 10V 0603 |
| 2478 | 3198 017 41050 | 1µF 10V 0603 |
| 2479 | 3198 017 41050 | 1µF 10V 0603 |
| 2480 | 3198 017 41050 | 1µF 10V 0603 |
| 2481 | 3198 017 41050 | 1µF 10V 0603 |
| 2482 | 3198 017 41050 | 1µF 10V 0603 |
| 2483 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2510 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2513 | 4822 124 23002 | 10µF 16V |
| 2514 | 4822 122 33752 | 15pF 5% 50V |
| 2515 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2516 | 3198 016 36810 | 680pF 25V 0603 |
| 2517 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2518 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2519 | 3198 016 31020 | 1nF 25V 0603 |
| 2520 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2703 | 4822 124 23002 | 10µF 16V |
| 2712 | 3198 017 41050 | 1µF 10V 0603 |
| 2714 | 2020 012 93795 | 470µF 20% 16V |
| 2718 | 3198 017 41050 | 1µF 10V 0603 |
| 2719 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2724 | 4822 124 12095 | 100µF 20% 16V |
| 2736 | 4822 124 80791 | 470µF 20% 16V |
| 2737 | 4822 124 80791 | 470µF 20% 16V |
| 2738 | 3198 016 31020 | 1nF 25V 0603 |
| 2739 | 3198 016 31020 | 1nF 25V 0603 |
| 2741 | 4822 126 13881 | 470pF 5% 50V |
| 2742 | 4822 126 13881 | 470pF 5% 50V |
| 2910 | 4822 126 13881 | 470pF 5% 50V |
| 2911 | 3198 030 72290 | 22µF 20% 35V |
| 2920 | 4822 124 80151 | 47µF 16V |
| 2921 | 4822 124 80151 | 47µF 16V |

| | | |
|---|---|---|
| 2930 | 4822 124 80791 | 470µF 20% 16V |
| 2931 | 4822 126 13881 | 470pF 5% 50V |
| 2933 | 4822 124 80791 | 470µF 20% 16V |
| 2934 | 4822 126 13193 | 4.7nF 10% 63V |
| 2935 | 4822 124 80195 | 470µF 20% 10V |
| 2936 | 5322 126 11578 | 1nF 10% 50V 0603 |
| 2937 | 5322 126 11578 | 1nF 10% 50V 0603 |
| 2938 | 5322 126 11578 | 1nF 10% 50V 0603 |
| 2939 | 5322 126 11578 | 1nF 10% 50V 0603 |
| 2940 | 5322 126 11578 | 1nF 10% 50V 0603 |
| 2941 | 5322 126 11578 | 1nF 10% 50V 0603 |
| 2942 | 5322 126 11578 | 1nF 10% 50V 0603 |
| 2959 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2960 | 4822 124 80151 | 47µF 16V |
| 2961 | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2962 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2994 | 4822 124 11131 | 47µF 6.3V |
| 2995 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2996 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2997 | 4822 124 11131 | 47µF 6.3V |
| 2998 | 4822 124 42027 | 470µF 20% 6,3V |

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| | | |
|---|---|---|
| 3001 | 3198 021 31080 | 1Ω 5% 0603 |
| 3002 | 4822 051 30223 | 22kΩ 5% 0.062W |
| 3003 | 3198 021 31080 | 1Ω 5% 0603 |
| 3004 | 4822 051 30223 | 22kΩ 5% 0.062W |
| 3005 | 4822 051 30223 | 22kΩ 5% 0.062W |
| 3006 | 4822 051 30471 | 47Ω 5% 0.062W |
| 3007 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3008 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3009 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3010 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3012 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3013 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3016 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3019 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3020 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3022 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3023 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3024 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3025 | 2322 704 62702 | 2.7kΩ 1% |
| 3026 | 5322 117 13057 | 820Ω 1% 0.063W 0603 |
| 3027 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3028 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3029 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3030 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3031 | 4822 051 30471 | 47Ω 5% 0.062W |
| 3032 | 3198 021 31820 | 1.8kΩ 5% 0.062W 0603 |
| 3033 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3034 | 4822 117 12891 | 220kΩ 1% |
| 3035 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3036 | 2322 704 65603 | 65kΩ 0603 |
| 3037 | 4822 051 30683 | 68kΩ 5% 0.062W |
| 3048 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3049 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3050 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3051 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3052 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3054 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3055 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3056 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3057 | 4822 051 30681 | 680Ω 5% 0.062W |
| 3058 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3059 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3060 | 4822 051 30393 | 39kΩ 5% 0.062W |
| 3061 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3063 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3066 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3070 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3072 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3073 | 4822 051 30153 | 15kΩ 5% 0.062W |
| 3074 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3075 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3077 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3078 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3079 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3080 | 2322 704 61002 | 1kΩ 1% |
| 3081 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3082 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3083 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3084 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3086 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3087 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3088 | 4822 051 30332 | 3.3Ω 5% 0.062W |
| 3089 | 4822 051 30154 | 150kΩ 5% 0.062W |
| 3091 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3092 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3093 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3094 | 4822 051 30109 | 10Ω 5% 0.062W |
| 3096 | 4822 051 30332 | 3.3Ω 5% 0.062W |
| 3097 | 4822 051 30472 | 4.7Ω 5% 0.062W |
| 3101 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3102 | 4822 117 12891 | 220kΩ 1% |
| 3103 | 4822 051 30223 | 22kΩ 5% 0.062W |
| 3104 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3105 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3106 | 4822 117 12891 | 220kΩ 1% |
| 3107 | 4822 051 30223 | 22kΩ 5% 0.062W |
| 3108 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3109 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3110 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3111 | 4822 051 30273 | 27kΩ 5% 0.062W |
| 3112 | 4822 051 30682 | 6.8Ω 5% 0.062W |
| 3113 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3114 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3115 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3116 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3117 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3118 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3119 | 4822 051 30689 | 68Ω 5% 0.063W 0603 |
| 3120 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3121 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3122 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3302 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3303 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3309 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3311 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3314 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3315 | 4822 051 30154 | 150kΩ 5% 0.062W |
| 3316 | 4822 117 12968 | 820Ω 5% 0.62W |
| 3317 | 4822 051 30561 | 560Ω 5% 0.062W |
| 3319 | 4822 051 30273 | 27kΩ 5% 0.062W |
| 3320 | 4822 051 30183 | 18kΩ 5% 0.062W |
| 3321 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3322 | 4822 051 30682 | 6.8Ω 5% 0.062W |
| 3323 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3327 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3359 | 4822 051 30391 | 390Ω 5% 0.062W |
| 3370 | 4822 051 30681 | 680Ω 5% 0.062W |
| 3371 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3372 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3374 | 5322 117 11726 | 10Ω 5% |
| 3375 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3389 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3390 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3391 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3394 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3401 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3402 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3403 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3404 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3405 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3406 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3407 | 3198 031 13390 | 33Ω 5% 1206 |
| 3408 | 3198 031 13390 | 33Ω 5% 1206 |
| 3409 | 3198 031 13390 | 33Ω 5% 1206 |
| 3410 | 3198 031 13390 | 33Ω 5% 1206 |
| 3411 | 3198 031 13390 | 33Ω 5% 1206 |
| 3412 | 3198 031 13390 | 33Ω 5% 1206 |
| 3413 | 3198 031 13390 | 33Ω 5% 1206 |
| 3414 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3416 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3417 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3418 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3419 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3420 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3421 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3422 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3423 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3424 | 3198 031 11030 | 10kΩ 5% 1206 |
| 3427 | 3198 021 31080 | 1Ω 5% 0603 |
| 3428 | 3198 021 31080 | 1Ω 5% 0603 |
| 3430 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3431 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3433 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3434 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3435 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3441 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3442 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3443 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3444 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3463 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3464 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3467 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3468 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3469 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3470 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3471 | 4822 117 12968 | 820Ω 5% 0.62W |
| 3472 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3473 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3474 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3475 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3476 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3477 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3478 | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3479 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3480 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3481 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3482 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3483 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3484 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3496 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3497 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3498 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3499 | 4822 117 12139 | 22Ω 5% 0.062W |
| 3501 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3502 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3503 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3504 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3505 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3506 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3507 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3510 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3511 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3512 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3513 | 4822 051 30221 | 220Ω 5% 0.062W |
| 3519 | 2422 549 42896 | Bead 120Ω 100MHz |
| 3520 | 4822 051 30333 | 33kΩ 5% 0.062W |
| 3706 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3717 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3719 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3722 | 5322 117 13056 | 8.2kΩ 1% 0.063W 0603 |
| 3725 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3726 | 4822 051 30392 | 3.9Ω 5% 0.063W 0603 |
| 3727 | 4822 051 30392 | 3.9Ω 5% 0.063W 0603 |
| 3730 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3732 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3744 | 5322 117 13056 | 8.2kΩ 1% 0.063W 0603 |
| 3745 | 5322 117 13056 | 8.2kΩ 1% 0.063W 0603 |
| 3910 | 4822 051 30222 | 2.2kΩ 5% 0.062W |
| 3911 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3930 | 3198 021 31080 | 1Ω 5% 0603 |
| 3932 | 2322 704 61002 | 1kΩ 1% |
| 3933 | 2322 704 63302 | 3.3kΩ 1% 0603 |
| 3934 | 3198 021 31080 | 1Ω 5% 0603 |
| 3935 | 3198 021 31080 | 1Ω 5% 0603 |
| 3936 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3937 | 2306 207 03151 | 150Ω 5% 0.5W |
| 3955 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3958 | 4822 051 30102 | 1kΩ 5% 0.062W |

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|---|---|---|
| 5002 | 2422 549 44197 | Bead 220Ω at 100MHz |
| 5003 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5004 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5005 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5006 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5007 | 2422 549 44197 | Bead 220Ω at 100MHz |
| 5008 | 2422 549 44197 | Bead 220Ω at 100MHz |
| 5009 | 2422 536 00667 | 1000µF 20% 7032 |
| 5010 | 3198 018 51090 | 10µH 10% 0603 |
| 5011 | 3198 018 51090 | 10µH 10% 0603 |
| 5012 | 3198 018 51090 | 10µH 10% 0603 |
| 5013 | 3198 018 64790 | 47µF 5% 1008 |
| 5060 | 2422 549 44197 | Bead 220Ω at 100MHz |
| 5070 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5071 | 2422 549 42896 | Bead 120Ω 100MHz |
| 5072 | 2422 549 42896 | Bead 120Ω 100MHz |
| 5321 | 3198 018 33970 | 0.39µF 10% 0805 |
| 5324 | 4822 157 71334 | 0.68µH 5% 1008 |
| 5370 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5371 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5372 | 2422 549 44197 | Bead 220Ω at 100MHz |
| 5401 | 4822 157 11717 | Bead 50Ω at 100MHz |
| 5402 | 4822 157 11717 | Bead 50Ω at 100MHz |
| 5403 | 4822 157 11717 | Bead 50Ω at 100MHz |
| 5404 | 4822 157 11717 | Bead 50Ω at 100MHz |
| 5462 | 4822 157 11717 | Bead 50Ω at 100MHz |
| 5520 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5706 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5910 | 2422 536 00667 | 1000µF 20% 7032 |
| 5920 | 2422 549 45333 | Bead 120Ω 100MHz |
| 5930 | 2422 535 94639 | 10µH 20% |
| 5931 | 2422 536 00689 | 220µF 20% |
| 5932 | 2422 535 94639 | 10µH 20% |
| 5956 | 2422 549 45333 | Bead 120Ω 100MHz |
| 5957 | 2422 549 45333 | Bead 120Ω 100MHz |
| 5958 | 2422 549 45333 | Bead 120Ω 100MHz |
| 5959 | 2422 549 45333 | Bead 120Ω 100MHz |
| 5961 | 2422 549 45333 | Bead 120Ω 100MHz |

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|---|---|---|
| 6002 | 4822 130 11397 | BAS316 |
| 6005 | 4822 130 11397 | BAS316 |
| 6006 | 4822 130 11397 | BAS316 |

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|---|---|---|
| 6060 | 9322 102 64685 | UDZ2.7B |
| 6061 | 4822 130 11397 | BAS316 |
| 6073 | 4822 130 80622 | BAT54 |
| 6076 | 4822 130 80622 | BAT54 |
| 6310 | 4822 130 11397 | BAS316 |
| 6323 | 4822 130 11525 | 1SS356 |
| 6460 | 9322 193 16685 | KDR721S |
| 6910 | 5322 130 34337 | BAV99 |
| 6911 | 9340 548 71115 | PDZ33B |
| 6930 | 9322 128 70685 | SMSS14 |

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|---|---|---|
| 7001 | 3198 010 43130 | BC807-25 |
| 7002 | 3198 010 42310 | BC847BW |
| 7003 | 3198 010 43130 | BC807-25 |
| 7004 | 3198 010 42310 | BC847BW |
| 7005 | 9322 208 05668 | NE555D |
| 7006 | 9322 208 05668 | NE555D |
| 7007 | 9322 208 05668 | NE555D |
| 7011 | 9352 761 83557 | TDA15021H/N1A11 |
| 7012 | 3198 010 42310 | BC847BW |
| 7013 | 3198 010 42310 | BC847BW |
| 7014 | 3198 010 42310 | BC847BW |
| 7015 | 5322 130 60159 | BC846B |
| 7016 | 5322 130 60159 | BC846B |
| 7060 | 4822 130 11155 | PDTC114ET |
| 7061 | 9340 547 13215 | BSH103 |
| 7070 | 9340 547 13215 | BSH103 |
| 7099 | 4822 209 17226 | M24C08-WMN6 |
| 7101 | 5322 130 60159 | BC846B |
| 7316 | 5322 130 42718 | BFS20 |
| 7320 | 3198 010 42310 | BC847BW |
| 7370 | 9340 550 49115 | PUMH7 |
| 7401 | 9322 210 77671 | GM5221-LF-BC |
| 7402 | 9322 156 81668 | M24C32-WMN6TNKSA |
| 7403 | 9322 205 12671 | MX29LV040QC-70G |
| 7404 | 4822 130 11155 | PDTC114ET |
| 7461 | 9322 199 80668 | SM5301BS-G |
| 7462 | 9322 145 26668 | M24C02-WMN6 |
| 7463 | 4822 209 60792 | 74HC4053D |
| 7510 | 9352 607 39118 | 74LVC14APW |
| 7520 | 9322 212 97668 | MK1575-01G |
| 7702 | 3198 010 42310 | BC847BW |
| 7703 | 3198 010 42310 | BC847BW |
| 7706 | 9352 500 20118 | 74LVC08AD |
| 7710 | 3198 010 42310 | BC847BW |
| 7712 | 9352 683 73118 | TDA1517ATW/N1 |
| 7910 | 4822 130 42804 | BC817-25 |
| 7920 | 9322 163 24668 | L78M08CDT |
| 7930 | 5322 209 90529 | MC34063AD |
| 7936 | 4822 130 41087 | BC638 |
| 7953 | 9322 199 25668 | L4940D2T12 |
| 7954 | 9322 157 51685 | SI12301DS |
| 7955 | 9322 189 19668 | LD1086D2T18 |

## Side I/O Panel [D]

### Various

| | | |
|---|---|---|
| 1101 | 4822 267 10484 | YKF51-5359 |
| 1102 | 4822 265 10658 | Soc 3P |
| 1105 | 2422 025 09406 | Connector 4p m |
| 1106 | 2422 026 05059 | Connector Phone |
| 1107 | 4822 267 10637 | Connector 5p |
| 1108 | 2422 025 10771 | Connector 10p m |
| 1111 | 2422 025 09406 | Connector 4p m |
| 1112 | 2422 025 10768 | Connector 3p m |

| | | |
|---|---|---|
| 2101 | 3198 016 31510 | 150pF 10% 50V 0603 |
| 2102 | 3198 016 31510 | 150pF 10% 50V 0603 |
| 2103 | 4822 126 13881 | 470pF 5% 50V |
| 2104 | 4822 126 13881 | 470pF 5% 50V |
| 2107 | 3198 016 31020 | 1nF 25V 0603 |
| 2108 | 3198 016 31020 | 1nF 25V 0603 |
| 2109 | 3198 016 31020 | 1nF 25V 0603 |
| 2110 | 3198 016 31020 | 1nF 25V 0603 |
| 2111 | 4822 124 12245 | 220µF 20% 10V |
| 2112 | 4822 124 12245 | 220µF 20% 10V |
| 2113 | 4822 126 13881 | 470pF 5% 50V |
| 2114 | 4822 126 13881 | 470pF 5% 50V |
| 2117 | 2020 552 96305 | 4.7µF 20-80% 10V |

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|---|---|---|
| 3101 | 4822 051 30109 | 10Ω 5% 0.062W |
| 3103 | 4822 051 30109 | 10Ω 5% 0.062W |
| 3104 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3105 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3106 | 4822 051 30759 | 75Ω 5% 0.062W |
| 3107 | 4822 051 30223 | 22kΩ 5% 0.062W |
| 3108 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3109 | 4822 051 30223 | 22kΩ 5% 0.062W |
| 3110 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3115 | 4822 051 30121 | 120Ω 5% 0.062W |
| 3116 | 4822 051 30121 | 120Ω 5% 0.062W |
| 3123 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3124 | 4822 051 30101 | 100Ω 5% 0.062W |
| 3125 | 4822 051 30102 | 1kΩ 5% 0.062W |
| 3126 | 4822 051 30183 | 18kΩ 5% 0.062W |
| 3127 | 4822 051 30183 | 18kΩ 5% 0.062W |

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|---|---|---|
| 61xx | 4822 130 11148 | UDZ4.7B |

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|---|---|---|
| 7101 | 4822 130 60373 | BC856B |

## Top Control [E]

### Various

| | | |
|---|---|---|
| 1309 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1310 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1311 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1312 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 1313 | 4822 276 13775 | Switch 1p 0.1A 12V |
| 8308▲ | 3139 110 27581 | Cable 2p 180 |

| | | |
|---|---|---|
| 3318 | 4822 051 30151 | 150Ω 5% 0.062W |
| 3319 | 4822 051 30391 | 390Ω 5% 0.062W |
| 3320 | 4822 117 12903 | 1.8kΩ 1% 0.063W 0603 |
| 3321 | 4822 117 12968 | 820Ω 5% 0.62W |
| 3322 | 4822 051 30008 | Jumper 0603 |
| 3323 | 4822 051 30008 | Jumper 0603 |

| | | |
|---|---|---|
| 6306 | 4822 130 11148 | UDZ4.7B |

## Audio Amplifier Panel [H]

### Various

| | | |
|---|---|---|
| 1703 | 2422 025 17117 | Connector 2p m |
| 1704 | 2422 025 16966 | Connector 5p m |
| 1706 | 2422 025 16702 | Connector 5p m |

| | | |
|---|---|---|
| 2703 | 4822 124 23002 | 10µF 16V |
| 2712 | 3198 017 41050 | 1µF 10V 0603 |
| 2713 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2714 | 2020 021 91871 | 470µF 20% 16V |
| 2715 | 2020 021 91871 | 470µF 20% 16V |
| 2718 | 3198 017 41050 | 1µF 10V 0603 |
| 2719 | 2238 586 59812 | 100nF 20% 50V 0603 |
| 2741 | 4822 126 13881 | 470pF 5% 50V |
| 2742 | 4822 126 13881 | 470pF 5% 50V |
| 2746 | 3198 017 41050 | 1µF 10V 0603 |

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|---|---|---|
| 3701 | 4822 051 30332 | 3.3Ω 5% 0.062W |
| 3702 | 4822 051 30332 | 3.3Ω 5% 0.062W |
| 3706 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3714 | 5322 117 13056 | 8.2kΩ 1% 0.063W 0603 |
| 3715 | 4822 117 12903 | 1.8kΩ 1% 0.063W 0603 |
| 3726 | 5322 117 13056 | 8.2kΩ 1% 0.063W 0603 |
| 3727 | 4822 117 12903 | 1.8kΩ 1% 0.063W 0603 |
| 3744 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3746 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3747 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3748 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3749 | 4822 051 30103 | 10kΩ 5% 0.062W |
| 3750 | 4822 051 30682 | 6.8Ω 5% 0.062W |
| 3751 | 4822 051 30682 | 6.8Ω 5% 0.062W |

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|---|---|---|
| 5709 | 4822 157 11716 | Bead 30Ω at 100MHz |
| 5710 | 4822 157 11716 | Bead 30Ω at 100MHz |

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|---|---|---|
| 7703 | 9340 425 20115 | BC847BS |
| 7709 | 9322 206 09668 | TDA7297D |

## LED & IR [J]

### Various

| | | |
|---|---|---|
| 1870 | 4822 265 31067 | Connector 7p m |

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|---|---|---|
| 2801 | 2020 552 96637 | 10µF 10% 6.3V 0805 |
| 2802 | 2020 552 96637 | 10µF 10% 6.3V 0805 |

| | | |
|---|---|---|
| 3801 | 4822 051 30332 | 3.3Ω 5% 0.062W |
| 3802 | 4822 051 30331 | 330Ω 5% 0.062W |
| 3803 | 4822 051 30221 | 220Ω 5% 0.062W |

| | | |
|---|---|---|
| 6801 | 9322 192 35676 | SPR-325MVW |

| | | |
|---|---|---|
| 7801 | 4822 130 60373 | BC856B |
| 7802 | 9322 207 16667 | TSOP34836LL1B |
| 7803 | 5322 130 60159 | BC846B |
| 7804 | 5322 130 60159 | BC846B |

# 11. Revision List

**Manual xxxx xxx xxxx.0**

- First release.